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ACCIDENTS AT METALLURGICAL WORKS IN THE UNITED STATES

DURING THE CALENDAR YEAR 1924

BY

WILLIAM W. ADAMS

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ACCIDENTS AT METALLURGICAL WORKS IN THE UNITED STATES DURING THE CALENDAR YEAR 1924[1]

By WILLIAM W. ADAMS

INTRODUCTION

A reduction in the fatality and injury rates, an increase in the number of men employed, and a larger volume of work measured by man-days of labor performed were the outstanding features of the milling and smelting industry in the United States in 1924 as compared with 1923. These facts, which form the basis for this publication, are shown by a study of the reports from operating companies to the Bureau of Mines, Department of Commerce. The figures relate to all metallurgical plants except those in the steel industry.

Reports for the calendar year 1924 showed 56,196 employees at all smelters, ore-dressing plants, and auxiliary works, or an increase of 2,325 men over the number employed in 1923. The total working time was equivalent to 18,884,463 man shifts, an increase of about 6 per cent, and the average work days per man during the year was 336 as compared with 331 during the preceding year. The aggregate number of man shifts worked by all employees, either at mills or smelters, in 1924 has not been equaled since 1920; the number of man shifts at auxiliary works has been exceeded but once, in 1923, since 1920, and then by about 2 per cent. Accidents among the employees resulted in 55 deaths and in injury to 8,226 men; each of these injuries disabled the workman beyond the remainder of the day on which he was injured. Revised figures for the previous year showed 58 deaths and 8,424 injuries. Thus, the frequency of accidents per thousand full-time or 300-day workers in 1924 was 0.87 for fatalities and 131 for nonfatal injuries, as compared with 0.97 and 142, respectively, in 1923.

Of the 8,281 accidents during the year 55 (0.66 per cent) were fatal, 5 (0.06 per cent) caused permanent total disability, 172 (2.08 per cent) caused permanent partial disability, 2,100 (25.36 per cent) caused temporary disability for more than 14 days, and 5,949

[1] This publication does not cover iron blast furnaces.

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(71.84 per cent) caused temporary disability not exceeding 14 days but exceeding the remainder of the day on which the accident occurred. As these figures are based on operators' returns that do not give detailed circumstances of each accident, it is not possible to state accurately the amount of lost time caused by the accidents. However, from studies of accidents at a small number of typical mines, the bureau has estimated the amount of time lost from accidents of various types. If each fatality and permanent total disability is weighted as representing 6,000 lost days to the industry or to the employee's family, and other classes of accidents weighted according to the method explained on page 11, the 8,281 accidents of all kinds in 1924 represent a loss of time equivalent to 600,000 man days, as compared with 661,000 man days in the preceding year. The time lost from accidents was equivalent to 3.2 per cent of the total man days worked in 1924 and 3.7 per cent of the man days worked in 1923. The average time-loss equivalent per accident, including deaths as well as injuries, was 73 days in 1924 and 78 days in 1923.

Table 1 presents a general review of the principal data concerning accidents and men employed at metallurgical plants since 1913, the first year for which statistics are available.

ACKNOWLEDGMENTS

The Bureau of Mines gratefully acknowledges the cooperation of owners and operators of metallurgical plants and others interested in the metallurgical industry whose voluntary reports of accidents at their properties furnished the basis of the statistical tables herein presented.

Data for California were furnished by the industrial accident commission of that State. For assistance in the compilation of the various tables credit is due Miss L. S. Gerry and Miss E. V. Walters, of the Bureau of Mines.

SCOPE OF STATISTICS

The tables in this paper have been compiled by the Bureau of Mines from reports furnished directly (except in California) by operators of ore-dressing plants and smelters. The data for California were furnished by the industrial accident commission of that State. The statistics represent the entire metallurgical industry, except iron blast-furnace plants, accident reports for those not being received by the Bureau of Mines. The figures for smelting plants cover copper, lead, gold, and silver smelters and refineries; those for ore-dressing plants represent concentrating plants for copper ores, lead ores, and zinc ores, stamp mills, cyanide plants, iron-ore washers, flotation mills, and sampling works.

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TABLE 1.—*Summary of labor and accidents at metallurgical plants*

	Men employed		Days of labor performed	Average days active	Total number killed	Number killed per thousand 300-day workers	Total number injured	Number injured per thousand 300-day workers
	Actual number	300-day workers						
Ore-dressing plants:								
1913	14,985	16,154	4,846,338	323	16	0.99	1,977	122.38
1914	15,128	15,225	4,567,529	302	23	1.51	1,434	94.19
1915	18,564	19,107	5,732,184	309	30	1.57	2,095	109.65
1916 [1]	22,365	23,470	7,041,083	315	33	1.41	3,184	135.66
1917 [1]	24,111	24,372	7,311,499	303	47	1.93	2,952	121.12
1918 [1]	21,809	22,517	6,754,962	310	35	1.55	3,142	139.54
1919 [1]	17,262	16,862	5,058,545	293	25	1.48	2,057	122.21
1920 [1]	16,827	16,813	5,043,911	300	21	1.25	2,624	156.07
1921 [1]	10,047	8,037	2,411,148	240	4	.50	1,214	151.05
1922 [1]	11,676	11,052	3,315,471	284	12	1.09	1,984	179.51
1923 [1] (revised)	14,899	14,782	4,434,744	298	24	1.62	2,549	172.44
1924 [1]	15,735	16,093	4,828,014	307	20	1.24	2,511	156.03
Smelting plants: [2]								
1913	20,564	24,309	7,292,766	355	47	1.93	4,247	174.71
1914	27,879	32,336	9,700,769	348	33	1.02	5,673	175.44
1915	31,327	36,262	10,878,486	347	38	1.05	5,718	157.69
1916 [1]	43,829	49,363	14,809,046	338	36	.73	9,656	195.61
1917 [1]	44,376	50,659	15,197,643	342	53	1.05	7,745	152.88
1918 [1]	39,899	45,439	13,631,601	342	42	.92	6,743	148.40
1919 [1]	28,777	31,324	9,397,082	327	34	1.09	4,431	141.46
1920 [1]	26,099	30,411	9,123,186	350	20	.66	4,147	136.37
1921 [1]	14,621	14,204	4,261,304	293	14	.99	2,129	149.89
1922 [1]	19,495	20,887	6,266,159	321	16	.77	3,002	143.71
1923 [1]	22,439	26,677	8,003,175	357	17	.64	3,487	130.71
1924 [1]	24,941	29,231	8,769,224	352	16	.55	3,293	112.65
Auxiliary works:								
1913, 1914, 1915 [3]								
1916	14,007	15,763	4,729,010	338	14	.89	2,240	142.10
1917	15,555	17,014	5,104,146	328	16	.94	2,881	169.33
1918	18,044	20,111	6,033,184	334	17	.85	2,808	139.63
1919	15,081	16,172	4,851,726	322	5	.31	1,638	101.29
1920	16,306	18,363	5,508,756	338	20	1.08	2,092	113.92
1921	8,762	8,308	2,492,519	284	9	1.08	1,151	138.54
1922	12,829	14,069	4,220,688	329	17	1.21	1,692	120.26
1923	16,533	18,040	5,411,850	327	17	.94	2,388	132.37
1924	15,520	17,624	5,287,225	341	19	1.08	2,422	137.43

[1] Not including auxiliary works, as shops, yards, etc.
[2] Exclusive of iron blast furnaces.
[3] Not separately reported.

CLASSIFICATION OF ACCIDENTS

Beginning with 1916, the bureau's statistics of accidents at metallurgical plants have divided all injuries into five main classes, as follows: (1) Fatalities; (2) permanent total disabilities; (3) permanent partial disabilities; (4) temporary disabilities lasting more than 14 days; (5) temporary disabilities not exceeding 14 days but more than the remainder of the shift.

During the nine years covered by the table that follows 86,765 fatal and lost-time accidents at metallurgical plants have been reported to the Bureau of Mines. Of these 603 (0.70 per cent) were fatal, 46 (0.05 per cent) resulted in permanent total disability 1,628, (1.88 per cent) resulted in permanent partial disability, 20,304 (23.40 per cent) caused temporary disability for more than 14 days, and 64,184 (73.97 per cent) caused temporary disability for more than the remainder of the shift but not exceeding 14 days. During this period the employees worked more than 179,000,000 man shifts, so that the volume of exposure to occupational hazards indicates that

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the foregoing distribution of accidents may be accepted as typical of the severity of accidents among persons engaged in the industry. The average yearly accident-frequency rate for the nine-year period was about 145 accidents per thousand full-time or 300-day workers. The rates may be segregated to show the different classes of accidents, as follows:

Classification of accidents

Fatalities	1.01
Permanent total disabilities	.08
Permanent partial disabilities	2.73
Serious temporary injuries	34.03
Slight temporary injuries	107.57
Total number of fatal and lost-time accidents per thousand 300-day workers	145.42

Fatal and nonfatal accidents, 1916–1924

	1916	1917	1918	1919	1920	1921	1922	1923	1924
1. Fatal	83	116	94	64	61	27	45	58	55
2. Serious (time lost, more than 14 days):									
Permanent disability—									
Total [1]	17	5	7	2	2	0	2	1	4
Partial [2]	200	202	247	71	147	38	76	163	90
Others	3,443	3,302	3,028	[3] 1,869	[3] 1,990	[3] 1,025	[3] 1,625	[3] 2,239	[3] 2,185
3. Slight (time lost, 1 to 14 days, inclusive)	11,420	10,069	9,411	6,184	6,724	3,431	4,975	6,021	5,940
Total nonfatal injuries	15,080	13,578	12,693	8,126	8,863	4,494	6,678	8,424	8,229
Grand total (fatal and nonfatal)	15,163	13,694	12,787	8,190	8,924	4,521	6,723	8,482	8,284
Men employed	80,201	84,042	79,752	61,120	59,232	37,465	44,000	53,871	56,190

[1] Permanent total disability: Loss of both legs or arms, one leg and one arm, total loss of eyesight, paralysis, or other condition permanently incapacitating workman from doing any work of a gainful occupation.
[2] Permanent partial disability: Loss of one foot, leg, hand, eye, one or more fingers, one or more toes, any dislocation where ligaments are severed, or any other injury known in surgery to be permanent partial disability.
[3] "Other serious accidents" in 1919 include 50 cases of permanet partial disability; in 1920, 72 cases of permanent partial disability and 1 case of permanent total disability; in 1921, 18 cases of permanent partial disability and 2 cases of permanent total disability; in 1922, 83 cases of permanent partial disability and 2 cases of permanet total disability; in 1923, 89 cases of permanent partial disability; and in 1924, 82 cases of permanent partial disability and 1 case of permanent total disability.

METALLURGICAL-PLANT ACCIDENTS, 1919–1924

Table 17 shows the causes and the degree of severity of accidents at metallurgical plants during the 6-year period 1919–1924 and the number of accidents in each group. During this period the average annual number of employees at mills was 14,571, at smelters 22,910, and at auxiliary plants 14,308. The total exposure to hazard at mills was equivalent to 25,091,833 days, at smelters 45,820,130 days, and at auxiliary plants 27,772,764 days. The accident rates, including both fatal and nonfatal injuries, were 156 for mills, 135 for smelters, and 124 for auxiliary plants per 1,000, 300-day workers. The fatality rates included in these figures for the 6-year period were 1.27 for mills, 0.77 for smelters, and 0.94 for auxiliary works.

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ACCIDENTS AT ORE-DRESSING PLANTS

Statistics of accidents at ore-dressing plants were first collected by the Bureau of Mines for the calendar year 1913. The volume of work performed by the entire industry during that year was equivalent, in round numbers, to 4,846,000 man shifts. With an index value of 100 in 1913 as a basis, the record shows that in 1914 the number of man shifts worked fell to an index value of 94. The next year the index rose to 118 and reached its peak of 151 in 1917. A decline then set in and continued until 1921, when the lowest level was reached, the index being only 50. The next year showed an improvement, with an index of 68, followed by 92 for 1923 and 100 for 1924. Thus, as to total volume of work performed, the industry has experienced its war-time stimulus, its postwar reaction, and has again reached its pre-war level.

Accidents at the mills during 1924 resulted in 20 deaths and 2,511 nonfatal lost-time injuries among the 15,735 men employed. In order to make a comparison, the average of 307 workdays per man, as shown by the operators' returns, was reduced to a standard basis of 300 days. The figures show a fatality rate of 1.24 and an injury rate of 156 per thousand men employed, as compared with revised rates of 1.62 and 172, respectively, for 1923. Although it is gratifying that the fatality and injury rates in 1924 are lower than those in the previous year, it is more significant, in view of the element of chance in the rise and fall in the yearly rates, that the figures in 1924 also showed a lower fatality rate than the average for the 11 years preceding 1924. The 1924 rates for nonfatal injuries, however, was higher than the 11-year average, although it was lower than the injury rates for 1923 or 1922. The 11-year average rates for the years 1913 to 1923, inclusive, were 1.43 for fatalities and 134 for injuries per thousand full-time or 300-day workers.

Of the 20 fatalities reported by operating companies in 1924, 5 were caused by machinery, 4 by suffocation in ore bins, 3 by persons falling, 2 by electricity, and 1 each by plant haulage, railway cars, crushers, and falling objects. The causes of 2 fatalities were not revealed by the reports. Of the 2,511 nonfatal injuries the main causes were falls of persons, falling objects, hand tools, "other machinery," nails and splinters, crushers, and flying pieces of rock from sledging or crushers. Each of these causes was responsible for 100 or more injuries during the year.

Table 7 shows the number of injuries in 1924 that resulted in permanent disability, either total or partial, and the number that caused temporary disability, either for more than two weeks or for two weeks or less. It is estimated that all of these accidents, fatal as well as nonfatal, represented a loss of time equivalent to 194,000

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man shifts, an average of 77 days per accident, as compared with 205,000 man shifts in 1923, representing an average of 80 days per accident. The lost time from accidents was equivalent to 4 per cent of the total man shifts worked in 1924, as compared with 4.6 in 1923.

More than 48 per cent of the men working at mills in 1924 were employed on the basis of 8 hours per day; about 6 per cent worked 9 hours; nearly 12 per cent 10 hours; less than 1 per cent 11 hours; and slightly less than 4 per cent 12 hours per day. Reports covering the remainder of the employees did not show the length of shift.

ACCIDENTS AT SMELTERS

Fatalities and injuries at smelting plants in 1924 were fewer in proportion to the number of employees than in any other year covered by available records. In 1913, the first year for which statistics were compiled by the Bureau of Mines, the fatality rate per thousand full-time or 300-day workers was 1.93; in 1924 it was 0.55. The nonfatal injury rate in 1913 was 175 and in 1924 only 113. For the 11 years preceding 1924 the average annual death rate was 0.97 and the average injury rate 157. Thus, the fatality rate for 1924 was 14 per cent below the rate for the previous year and 43 per cent lower than the average 11-year rate. The injury rate in 1924 was 14 per cent lower than in 1923 and 28 per cent lower than the 11-year average rate.

The volume of employment at all smelters in 1913 was equivalent to 7,292,766 man shifts of work. If this number is represented by an index value of 100, the record shows a constantly upward trend to 1917, the index for that year being 208, which was than double the figure for 1913. A decline began in 1918, the index for the year being 187, and the downward trend continued until 1921, when it reached its lowest level, the index for the year being 58, as compared with 100 for 1913. Since 1921 a yearly improvement has been shown, until in 1924 the reports showed 8,769,224 man shifts of work performed, representing an index value of 120.

Sixteen deaths and 3,293 injuries resulted from accidents at smelters in 1924. Men employed numbered 24,941, and the volume of work by all employees indicated an average of 352 workdays per man, as compared with 357 days in 1923. Four men were killed by cars or motors at the smelters, 3 by burns from matte or slag, 2 each by railway cars and flying or falling objects, and 1 each by machinery, falls of persons, burns from gas, scalding, and explosion of hot metal. The nonfatal injuries—including all that disabled an employee beyond the day of the accident—were due mainly to burns from matte or slag, flying or falling objects, hand tools, falls of persons, haulage, machinery, and hot-metal explosions. At least 100 accidents resulted from each of the causes enumerated.

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Both fatal and nonfatal accidents at smelters in 1924 are estimated to represent a loss of time equivalent to 168,000 man shifts, as compared with a loss of 236,000 man shifts from accidents in 1923. The accidents in 1924, in addition to the 16 fatalities, included 33 cases of permanent partial disability, 1,008 temporary disabilities extending beyond 14 days, and 2,252 temporary disabilities not exceeding 14 days but lasting more than the remainder of the day on which the accidents occurred. The estimated loss of time from these accidents, fatal and nonfatal, represented an average loss of time equal to 51 days per accident in 1924, against 67 days per accident in 1923. In other words, the time lost from all accidents in 1924 was equal to 2 per cent of the total man shifts worked that year by all employees; in 1923 it was 3 per cent.

Eight hours constituted a standard day's work for 75 per cent of the men employed at smelters in 1924, 9 hours for about 2 per cent of the men, and 12 hours for 1 per cent.

ACCIDENTS AT AUXILIARY WORKS

Separate figures covering auxiliary works—yards, shops, construction, etc., in connection with mills and smelters—are available for the years 1916 to 1924, inclusive. During the first year of this 9-year period 4,729,010 man shifts of work were done, and the accident reports showed a fatality rate of 0.89 and an injury rate of 142 per thousand 300-day workers. In 1924 the man shifts numbered 5,287,225, an increase of more than 11 per cent over 1916. The injury rate per thousand employees declined to 137, but the fatality rate rose to 1.08. For the eight years preceding 1924 the average yearly fatality rate was 0.90 and the average yearly injury rate 132. Thus, the 1924 rate indicated no substantial change as to fatalities when compared with the preceding eight years, although it was somewhat higher than in 1923, the rate for which was 0.94. The injury rate in 1924 was 5 points higher than the 8-year average rate, 5 points higher than the 1923 rate, and 17 points above that for 1922. The lowest fatality rate on record was 0.31 in 1919 and the highest was 1.21 in 1922; the lowest injury rate was 101 in 1919 and the highest was 169 in 1917.

Auxiliary plant returns for 1924 showed 15,520 employees who averaged 341 workdays per man, as compared with 327 days in 1923. The average working time was 57 days more per man than the low-record year of 1921 and 3 days more per man than in 1916 or 1920, the previous high-record years. The index value of 100, used to represent the man shifts worked by all employees in 1916, may be compared with an index of 112, representing the volume of work done in 1924, and with an index of 128, representing 1918, the year

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of largest volume of work, and with an index of 53 for 1921, the year of smallest volume of employment.

Accidents during 1924 caused 19 deaths and 2,422 injuries, each injury causing disability beyond the remainder of the day on which the accident occurred. Of the 19 fatalities 4 were caused by machinery and 4 by falling objects, 2 each by haulage, electricity, and persons falling from ladders or scaffolds, and 1 each by railway cars and hand tools. The causes of 3 fatalities were not shown. The main causes of the nonfatal injuries were hand tools, falling objects, falls of persons, machinery, nails and splinters, haulage, and handling hot materials. The nonfatal injuries included 1 permanent total disability, 24 permanent partial disabilities, 604 temporary disabilities lasting longer than 14 days each, and 1,793 temporary disabilities classified as "slight," indicating that the employees' disability did not exceed 14 days but lasted beyond the day of the accident. It is estimated, in the manner explained on page 11, that these accidents caused a loss of time equal to 169,000 man shifts, or about 3.2 per cent of the shifts worked by all employees during the year. Figures for 1923 show an estimated loss from accidents of 151,000 man shifts, or 2.8 per cent of the time worked that year. The average lost-time equivalent of all accidents, fatal as well as nonfatal, was approximately 69 days in 1924, as against 63 days in 1923.

Eight hours constituted a standard day's work for 39 per cent of the men employed in 1924 and 9 hours for 20 per cent. Reports for plants employing 41 per cent of the men either did not indicate the length of shift or else showed some other basis than 9 or 10 hours.

ACCIDENTS AT COPPER MILLS AND SMELTERS

Tables 18 and 19 present special data for a selected list of mills and smelters treating copper ores from 1916 to 1924, inclusive. The figures for 1924 cover 24 copper mills employing 5,584 men in Arizona, California, Michigan, Montana, Nevada, New Jersey, New Mexico, and Utah; they also cover 26 smelters treating copper ores and employing 11,189 men in Arizona, California, Maryland, Michigan, Montana, Nevada, New Jersey, New York, Pennsylvania, Tennessee, Virginia, and Washington.

A comparison of the 1924 accident rates for mills shows an improvement in the rate for nonfatal injuries over the three previous years, but a somewhat higher rate for accidents that resulted in death. The injury rate for smelters was much below the record for the three previous years and also lower than the 1916–1920 average 5-year rate for injuries at copper smelters. The fatality rate, while higher than in 1923, was considerably lower than the rates for 1921 and 1922 and the average rate for the five years ending with 1920.

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ACCIDENT RATES BASED ON HOURS OF EXPOSURE

Beginning in 1922, this series of reports presented accident rates for mills and smelters calculated on a uniform number of hours of work performed by the employees. The purpose was twofold: (1) To reveal what difference, if any, existed in the accident-frequency experience of men working a different number of hours per day; (2) to make available accident-frequency rates that would be comparable with those for other industries.

Table 21 presents, for the year 1924, data showing the number of accidents per million hours of work done by men employed 8, 9, or 10 hours per day. The table further shows the frequency rates for accidents according to degree of severity; that is, for fatalities, permanent injuries, and temporary injuries.

In 1924, as in the two preceding years, the 9-hour men employed at mills had the lowest accident-frequency rate, the reports for 1924 showing 33 accidents per million hours of exposure; for the 8-hour men the rate was 68 per million hours; and for the 10-hour men the rate was 88. For men employed at smelters the rate for 8-hour men was 50 accidents per million hours, while the rate for 9-hour men was 32. Men employed at 9-hour smelters comprised only about 2 per cent of the total at all smelters, so that the rather low accident-frequency rate for the group in 1924 may be of little significance.

For both mills and smelters the great bulk of the employees work 8 hours a day. For example, in 1924, returns from mills reporting the length of a standard day's work showed a total of 28,000,000 man hours worked; of this total 19,000,000 hours were on the basis of 8 hours a day.

For smelters, the 8-hour shifts showed more than 52,000,000 hours out of a total of about 56,000,000 hours, as shown in Table 20. Because most of the men were employed at 8-hour plants, it is interesting to observe the accident-frequency rates at these plants during the past three years.

For each million man hours of work performed at mills working 8 hours a day the records showed 54 accidents in 1922, 55 in 1923, and 68 in 1924. These figures include fatalities and all nonfatal injuries causing disability beyond the remainder of the day on which the accident occurred. The increase shown by the rate for 1924 was distributed among all classes of accidents, but more particularly in the group of temporary injuries causing disability for 14 days or less. These accidents are classified as "slight," and the frequency rate for them in 1924 was nearly 52 per million man hours of exposure, or between 11 and 12 accidents more than in the two previous years. The decline in the rate for 8-hour smelters was likewise distributed among all classes of accidents. Except for permanent

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partial disabilities, the rate for which rose in 1923 and then fell to a new low point in 1924, the frequency rate of all classes of accidents at 8-hour smelters has declined steadily during the past three years. The following figures show the fluctuation in frequency rates per million hours for each class of accidents among 8-hour mills and smelters since 1921.

Number of accidents, fatal and nonfatal, per million hours

Class of accidents	1922	1923	1924	Class of accidents	1922	1923	1924
Mills:				Smelters:			
Deaths	0.469	0.371	0.730	Deaths	0.359	0.307	0.266
Permanent total				Permanent total	.030	.022	
Permanent partial	.391	.531	.730	Permanent partial	1.047	1.952	.456
Temporary serious	12.818	13.685	14.961	Temporary serious	16.248	15.352	15.073
Temporary slight	40.096	40.311	51.554	Temporary slight	45.662	36.209	34.078
Total nonfatal	53.305	54.527	67.245	Total nonfatal	62.987	53.535	49.607
Grand total	53.774	54.898	67.975	Grand total	63.346	53.842	49.873

COMPARISON OF ACCIDENT RATES FOR LARGE AND SMALL PLANTS

Table 22 presents, for the third consecutive year, a comparison of the accident-frequency rates for large and small plants. In 1924, as in the two preceding years, the larger plants—that is, those employing the most men—generally had fewer accidents in proportion to the number of men employed.

The lowest rate for ore-dressing plants was 99 accidents, both fatal and nonfatal per thousand full-time workers, and represented mills employing from 100 to 199 men each; the highest rate (260) was for mills employing from 1 to 9 men each. When all of the ore-dressing plants are grouped in two classes—those employing 100 or more men and those employing less than 100 men—the reports show a combined rate of 135 for the larger plants and 193 for the smaller plants. Both of these rates indicate an improvement over the previous year, as shown by the following figures, representing the number of fatal and nonfatal accidents based on a standard year of 300 workdays per man. It will be observed that accident frequency at the large plants has been steadily reduced.

Accidents per thousand full-time workers at ore-dressing plants

	1922	1923	1924
Small plants	198	208	193
Large plants	172	143	135

A similar comparison for smelters shows that the lowest accident rate, both fatal and nonfatal, was for the largest plants (those employing 300 or more men), the rate being 92 accidents per thousand

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full-time workers; the highest rate was 327, and represented plants employing from 25 to 49 men each. The combined rate for all smelters employing 100 or more men each was 106; the combined rate for all smelters employing less than 100 men each was 218. The lower rate in 1924 at small plants and the steady decline in accident frequency at the large plants during the past three years are indicated by the figures given below, which show the number of accidents per thousand 300-day employees.

Accidents per thousand full-time workers at smelters

	1922	1923	1924
Small plants	226	237	218
Large plants	139	124	106

CONTINUITY OF OPERATION AS AFFECTING RISK

Tables 23, 24, and 25 are included in this publication as an aid toward future study of accidents as affected by intermittency or continuity of operations. Admittedly, the record of a single year is inadequate for such a study, but it is hoped that cumulative data covering several years will assist in revealing to what extent, if any, part-time and full-time operation contributes to the accident record of industrial plants. It seems reasonable to believe that full-time employment promotes safety. Therefore, in presenting the data for 1924 as a beginning, it is hoped that safety engineers and others interested will direct their attention to this possible factor in accident-prevention work as it relates to individual plants over a representative number of years. As the accident-prevention problem is many sided, involving human as well as mechanical causative factors, it should be studied from as many angles as possible in order to ascertain the interrelationship among conditions and things that may produce occupational hazards. When the facts are available, the devising of measures to prevent accidents can be conducted on a scientific basis.

TIME LOST THROUGH ACCIDENTS AT METALLURGICAL PLANTS

The number of days lost annually in the metallurgical industry by accidents among the employees can not be stated with mathematical accuracy. Some idea, however, may be had by assigning to the various classes of accidents a certain number of days of disability on the basis of known facts. It is customary to consider 6,000 lost days as representing the economic loss caused by accidents that result in death or permanent total disability. This value was adopted by a committee of the International Association of Industrial Accident Boards and Commissions. The committee decided that

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a permanent partial disability should be weighted in days lost according to the degree of impairment as compared with a permanent total disability. Temporary disabilities are weighted according to number of days actually lost by the injured employee.

The accident reports furnished annually by metallurgical operators to the Bureau of Mines do not show the number of days during which the injured employees were unable to work. Certain studies conducted by the bureau in connection with accidents at metal mines and coal mines indicated that each case of temporary disability to men working underground lasts an average of 14 days; that injuries disabling a man for not more than 14 days average 6 lost days, and that those lasting more than 14 days average 32 lost days. Definite information for permanent partial disabilities is not available, but it is believed that at least 800 days are lost on the average from each injury of this kind.

On the above basis the 8,281 accidents at mills, smelters, and auxiliary works in 1924 (see table and footnote on p. 4) represent a loss of 600,494 days, distributed as follows, as compared with 660,526 lost days from accidents in 1923.

	Lost days
55 fatalities at 6,000 days each	330,000
5 permanent total disabilities at 6,000 lost days each	30,000
172 permanent partial disabilities at 800 lost days each	137,600
2,100 serious temporary injuries at 32 lost days each	67,200
5,949 slight temporary injuries at 6 lost days each	35,694
Total (8,281 accidents)	600,494

The above figures include all so-called "lost-time" accidents. They do not include accidents from which the injured employee recovered enough to return to work on the day after the accident.

STATISTICAL TABLES

The following tables show the classification and the number of accidents at metallurgical works in the United States during the calendar year 1924.

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TABLE 2.—*Number of men employed, number of days worked, and number of men killed and injured at metallurgical plants in the United States during the year ended December 31, 1924*

State	Ore-dressing plants					Smelting plants					Auxiliary works					Widows	Orphans
	Men employed	Shifts	Average days active	Killed	Injured	Men employed	Shifts	Average days active	Killed	Injured	Men employed	Shifts	Average days active	Killed	Injured		
Alabama	44	8,282	188								(1)						
Alaska [2]	277	93,439	337		36						(1)						
Arizona	1,967	694,532	353	8	444	2,338	821,689	351	7	506	1,551	540,998	349	3	376	7	7
Arkansas	(1)					(1)					(1)						
California [3]	637	176,839	278		103	825	264,151	320		108	261	61,631	236		9		
Colorado	629	189,692	302		55	926	324,386	350		106	196	69,920	357	1	21	1	5
Idaho	520	148,450	285	1	50	(1)					196	60,208	307	1	6	2	
Illinois	80	25,652	321		11	1,865	680,993	365		345	860	312,096	363		155		
Kansas	254	63,017	248		20	539	172,975	321		68	(1)						
Michigan	1,201	346,865	289	1	63	470	134,634	286		59	(1)						
Minnesota	399	59,190	148	1	38						60	9,950	166		44	1	3
Missouri	711	205,176	289	1	113	607	194,870	321		108	884	245,101	277		251	1	3
Montana	1,066	357,700	336		77	1,684	604,239	359	1	114	1,532	551,452	360		140	1	3
Nevada	834	257,166	308	1	108	886	322,610	364		99	256	79,461	310	1	46		
New Jersey	442	137,316	311		36	2,972	1,085,836	365	2	266	1,232	441,707	359	5	183	1	
New Mexico	537	192,488	358	2	161	(1)					(1)						
New York	1,090	327,691	301		137	(1)					1,102	335,368	304	2	158	1	1
Oklahoma	733	199,818	273		281	1,207	432,443	358	1	282	504	171,835	341	1	133	2	1
Oregon	28	7,480	267		4						(1)						
Pennsylvania	10	2,226	223			2,575	922,366	358		312	1,887	687,618	364		113		
South Dakota	197	68,636	348	1	20	(1)											
Tennessee	224	51,491	230		27	156	55,766	357		79	554	194,884	352	2	102	2	1
Texas	354	107,102	303		49	593	216,385	365		81	(1)						
Utah [4]	1,679	604,644	360	3	534	1,879	687,201	365	2	235	1,578	576,996	366		36	3	3
Vermont	81	24,217	299		45						(1)						
Virginia	225	62,108	276	1	13	(1)					184	53,550	291		14		
Washington	190	67,317	354		4	500	181,576	363		9	221	67,502	305	1	4	1	3
West Virginia						515	188,190	365		99	328	119,893	366		73		
Wisconsin	92	26,114	284		18						19	6,117	322	1	3		
Other States	1,234	323,366	262		64	4,404	1,478,914	336	3	417	2,115	700,938	331	1	555	4	5
Total, 1924	15,735	4,828,014	307	20	2,511	24,941	8,769,224	352	16	3,293	15,520	5,287,225	341	19	2,422	27	35
Total, 1923	14,899	4,434,744	298	24	2,549	22,439	8,003,175	357	17	3,487	16,533	5,411,850	327	17	2,388	20	53

[1] Included in "Other States."
[2] Stamp mills, other than at lode mines, not included.
[3] Figures relating to California, in this and all other tables, were supplied by the Industrial Accident Commission of the State of California, San Francisco, Calif.
[4] Figures relating to Utah, in this and all other tables ,were supplied by the Industrial Accident Commission, Salt Lake City, Utah.

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TABLE 3.—*Metallurgical plants: Fatalities, by causes and*

State	Ore-dressing plants [1]															
	Haulage system (cars, motors, etc.)	Railway cars and locomotives	Crushers, rolls, or stamps	Tables, jigs, etc.	Other machinery	Falls of persons	Suffocation in ore bins	Falling objects (rocks, timbers, etc.)	Cyanide or other poisoning	Scalding (steam or water)	Electricity	Hand tools, axes, bars, etc.	Nails, splinters, etc.	Flying pieces of rock from sledging or crushing	Other causes	Total
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
Arizona					1	3	1	1			1				1	8
Colorado																
Idaho											1					1
Michigan					1											1
Minnesota					1											1
Missouri		1														1
Montana																
Nevada							1									1
New Jersey																
New Mexico	1				1											2
New York																
Oklahoma																
South Dakota			1													1
Tennessee																
Utah					1		1								1	3
Virginia							1									1
Washington																
Wisconsin																
Other States																
Total, 1924	1	1	1		5	3	4	1			2				2	20
Total, 1923	2	3			5	5	2			1	1				5	24

[1] Stamp mills, sampling works, slime plants, lixiviation, leaching, cyanide, and flotation mills.

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States, during the year ended December 31, 1924

Smelting plants [1]															Auxiliary works [2]											
Haulage system (cars, motors, etc.)	Railway cars and locomotives	Cranes	Other machinery	Falls of persons	Suffocation in ore bins	Flying or falling objects (rocks, timber, etc.)	Gas (burns of asphyxiation)	Scalding (steam or water)	Electricity	Hand tools, axes, bars, etc.	Nails, splinters, etc.	Burns from matte, slag, or molten metal (pouring or spilling)	Hot-metal explosion	Other causes	Total	Haulage system (cars, motors, etc.)	Railway cars and locomotives	Falls of persons	Falling objects (rocks, timbers, etc.)	Nails, splinters, etc.	Hand tools, axes, bars, etc.	Electricity	Machinery	Failure of ladder, scaffold, or other support	Handling hot materials	Other causes	Total
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30		31	32	33	34	35	36	37	38	39	40	41	
2	1	---	---	1	---	1	1	---	---	---	---	1	---	---	7	1	---	---	---	---	---	---	2	---	---	---	3
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	1	---	---	---	1	---	---	---	1
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
---	---	---	1	---	---	---	---	---	---	---	---	---	---	---	1	---	---	---	---	---	---	---	---	---	---	---	---
---	---	---	---	---	---	---	---	---	---	---	---	2	---	---	2	---	1	---	2	---	---	---	1	---	---	2	5
---	---	---	---	---	---	---	---	---	---	---	---	---	1	---	1	---	---	---	1	---	---	1	---	1	---	---	2
1	1	---	---	---	---	---	---	---	---	---	---	---	---	---	2	---	---	---	---	---	---	1	---	1	---	---	2
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	1	---	---	---	---	---	1
1	---	---	---	---	---	1	---	1	---	---	---	---	---	---	3	1	---	---	---	---	---	---	---	---	---	1	1
4	2	---	1	1	---	2	1	1	---	---	---	3	1	---	16	2	1	---	4	---	1	2	4	2	---	3	19
2	1	---	2	3	1	1	1	---	---	---	---	1	3	2	17	2	3	2	---	---	---	6	1	---	1	2	17

[1] Blast, reverberatory, and roasting furnaces, converters, casting department, and refineries.
[2] Yards, shops, construction, etc.

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TABLE 4.—*Metallurgical plants: Injuries, by causes and*

State	Ore-dressing plants [1]															
	Haulage system (cars, motors, etc.)	Railway cars and locomotives	Crushers, rolls, or stamps	Tables, jigs, etc.	Other machinery	Falls of persons	Suffocation in ore bins	Falling objects (rocks, timbers, etc.)	Cyanide or other poisoning	Scalding (steam or water)	Electricity	Hand tools, axes, bars, etc.	Nails, splinters, etc.	Flying pieces of rock from sledging or crushing	Other causes	Total
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
Alabama																
Alaska	4		2	2	3	6		6		1	4	2	1		5	36
Arizona	19	17	22	4	23	45		53		7	11	41	46	21	135	444
Arkansas																(4)
California	6	1	5		8	30		11	1		1	8	4	11	17	103
Colorado	2	2	5	1	8	8	1	8				1	1	2	16	55
Idaho	2		5	2	5	6	1	4	1			5	6	1	12	50
Illinois					2	1				1		1	2		4	11
Kansas			2	1	2	1						4	1	3	6	20
Michigan	2		1		3	9		5				5	1	1	36	63
Minnesota	2	3			7	3	1	7				5		3	7	38
Missouri		2	7	8	27	9		10	1	2	2	14	5	2	24	113
Montana	5		4	1	17	9		7		1		6	4		23	77
Nevada		6	3	1	9	26		18	4		1	6	3	3	28	108
New Jersey	1	1	5		4	6		1				3	1		14	36
New Mexico	2	2	5	2	21	13		27			3	25	5	2	54	161
New York	8	2	12	2	22	12		17		1	4	20	11	10	16	157
Oklahoma	16		12	15	31	27		18				39	24	37	62	281
Oregon						1			1						2	4
Pennsylvania																
South Dakota			2		1			2							15	20
Tennessee				1	9	5		2				5	1		4	27
Texas	3	2	9		9	2		4		1		7	3	1	8	49
Utah	6	3	6		5	94	3	33		20	8	42	43	7	264	534
Vermont	5				2	1						2			35	45
Virginia	3				2			1		3	1				3	13
Washington						1		2				1				4
West Virginia																
Wisconsin					1	3		3				5	2		4	18
Other States	5		1		11	6		11		1		1	4	3	21	64
Total, 1924	91	41	108	40	232	324	6	250	8	38	35	248	168	107	815	2,511
Total, 1923	144	93	182	62	340	259	38	236	6	22	26	269	255	124	493	2,549

[1] Stamp mills, sampling works, slime plants, lixiviation, leaching, cyanide, and flotation mills.
[2] Blast, reverberatory, and roasting furnaces, converters, casting department, and refineries.

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States, during the year ended December 31, 1924

Smelting plants [1]															Auxiliary works [1]												
Haulage system (cars, motors, etc.)	Railway cars and locomotives	Cranes	Other machinery	Falls of persons	Suffocation in ore bins	Flying or falling objects (rocks, timber, etc.)	Gas (burns or asphyxiation)	Scalding (steam or water)	Electricity	Hand tools, axes, bars, etc.	Nails, splinters, etc.	Burns from matte, slag, or molten metal (pouring or spilling)	Hot-metal explosion	Other causes	Total	Haulage system (cars, motors, etc.)	Railway cars and locomotives	Falls of persons	Falling objects (rocks, timbers, etc.)	Nails, splinters, etc.	Hand tools, axes, bars, etc.	Electricity	Machinery	Failure of ladder, scaffold, or other support	Handling hot materials	Other causes	Total
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30		31	32	33	34	35	36	37	38	39	40	41	
																											[4]
23	9	10	35	35	1	115	2	3	12	63	9	81	13	95	506	20	12	49	66	39	42	9	41	10	10	78	376
															[4]												[4]
13	6	3	10	11	..	21	1	2	...	8	2	13	4	14	108	...	...	2	2	1	2	...	...	...	...	2	9
11	1	...	3	11	..	26	2	5	...	12	6	13	1	15	109	1	3	2	2	1	6	3	...	...	...	3	21
															[4]		1				4					1	6
30	1	...	6	23	..	54	8	1	...	28	1	107	17	69	345	25	...	15	21	11	10	2	8	4	2	57	155
...	1	...	...	2	..	19	...	3	...	8	...	9	10	16	68	...	...	...	...	...	...	...	...	...	...	...	[4]
4	2	...	...	10	..	18	...	...	...	8	...	6	...	11	59	...	...	...	...	...	...	...	...	...	...	...	...
3	1	1	2	6	..	24	...	...	...	10	5	16	6	34	108	2	2	2	9	2	11	...	6	...	1	9	44
4	1	7	7	9	..	23	...	3	2	5	3	17	1	32	114	5	4	22	21	21	27	5	28	3	6	109	251
1	4	1	8	17	..	31	2	...	...	9	6	14	1	5	99	2	...	29	20	12	11	...	16	3	14	33	140
6	43	7	6	15	..	44	1	5	2	32	5	64	18	18	266	1	...	11	11	4	...	1	6	...	2	10	46
															[4]	8	13	15	20	16	8	2	11	...	21	69	183
																											[4]
															[4]	8	1	19	29	14	12	4	22	1	3	45	158
11	...	...	8	16	..	29	1	2	...	13	3	72	4	123	282	15	...	9	8	4	12	...	15	3	7	60	133
																											[4]
11	3	...	4	19	..	28	2	2	...	31	10	43	12	147	312	4	4	14	7	2	22	1	7	...	4	48	113
5	...	...	1	4	..	12	...	...	1	18	...	25	4	9	79	7	4	5	12	6	24	1	12	1	13	17	102
7	...	...	1	3	..	15	...	2	...	11	1	22	...	19	81	...	...	...	...	...	...	...	...	...	...	...	[4]
17	7	4	9	26	..	31	2	...	1	28	2	55	...	53	235	2	5	5	3	1	6	1	4	...	...	9	36
															[4]	2	2	1	1	1	3	...	2	...	...	2	14
3	...	...	2	...	..	4	...	...	...	...	...	...	...	...	9	...	1	2	...	...	...	...	1	...	...	...	4
2	...	...	...	4	..	5	...	...	...	5	...	68	...	15	99	13	...	2	7	4	15	...	5	...	1	26	73
																				1	2						3
20	20	10	21	19	9	68	2	6	1	35	4	105	13	84	417	19	13	40	97	49	125	7	33	8	18	146	555
171	99	43	123	230	10	567	23	34	19	324	57	730	104	759	3,293	134	65	244	336	189	342	36	217	33	102	724	2,422
230	102	46	124	243	..	541	39	37	24	293	84	691	128	905	3,487	91	97	252	397	144	268	38	174	30	75	824	2,388

[1] Yards, shops, construction, etc.

[4] Included in "Other States."

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TABLE 5.—*Metallurgical plants: Percentage of fatalities and injuries, by causes, during the year ended December 31, 1924*

Cause of accident	Killed			Injured		
	Number killed	Per cent of group total	Per cent of grand total	Number injured	Per cent of group total	Per cent of grand total
Ore-dressing plants:						
1. Haulage system (cars, motors, etc.)	1	5.00	1.82	91	3.63	1.11
2. Railway cars and locomotives	1	5.00	1.82	41	1.63	.50
3. Crushers, rolls, or stamps	1	5.00	1.82	108	4.30	1.31
4. Tables, jigs, etc				40	1.59	.49
5. Other machinery	5	25.00	9.09	232	9.24	2.82
6. Falls of persons	3	15.00	5.45	324	12.90	3.94
7. Suffocation in ore bins	4	20.00	7.27	6	.24	.07
8. Falling objects (rocks, timbers, etc.)	1	5.00	1.82	250	9.96	3.04
9. Cyanide or other poisoning				8	.32	.10
10. Scalding (steam or water)				38	1.51	.46
11. Electricity	2	10.00	3.64	35	1.39	.43
12. Hand tools, axes, bars, etc				248	9.88	3.01
13. Nails, splinters, etc				168	6.69	2.04
14. Flying pieces of rock from sledging or crushing				107	4.26	1.30
15. Other causes	2	10.00	3.64	815	32.46	9.91
Total	20	100.00	36.36	2,511	100.00	30.53
Smelting plants:						
16. Haulage system (cars, motors, etc.)	4	25.00	7.27	171	5.19	2.08
17. Railway cars and locomotives	2	12.50	3.64	99	3.01	1.20
18. Cranes				43	1.30	.52
19. Other machinery	1	6.25	1.82	123	3.74	1.50
20. Falls of persons	1	6.25	1.82	230	6.98	2.80
21. Suffocation in ore bins				10	.30	.12
22. Flying or falling objects (rocks, timbers, etc.)	2	12.50	3.64	567	17.22	6.89
23. Gas (burns or asphyxiation)	1	6.25	1.82	23	.70	.28
24. Scalding (steam or water)	1	6.25	1.82	34	1.03	.41
25. Electricity				19	.58	.23
26. Hand tools, axes, bars, etc				324	9.84	3.94
27. Nails, splinters, etc				57	1.73	.69
28. Burns from matte, slag, or molten metals (pouring or spilling)	3	18.75	5.45	730	22.17	8.88
29. Hot-metal explosions	1	6.25	1.82	104	3.16	1.26
30. Other causes				759	23.05	9.23
Total	16	100.00	29.09	3,293	100.00	40.03
Auxiliary works:						
31. Haulage system (cars, motors, etc.)	2	10.53	3.64	134	5.53	1.63
32. Railway cars and locomotives	1	5.26	1.82	65	2.69	.79
33. Falls of persons				244	10.08	2.96
34. Falling objects (rocks, timbers, etc.)	4	21.05	7.27	336	13.87	4.08
35. Nails, splinters, etc				189	7.80	2.30
36. Hand tools, axes, bars, etc	1	5.26	1.82	342	14.12	4.16
37. Electricity	2	10.53	3.64	36	1.49	.44
38. Machinery	4	21.05	7.27	217	8.96	2.64
39. Failure of ladder, scaffold, or other support	2	10.53	3.64	33	1.36	.40
40. Handling hot materials				102	4.21	1.24
41. Other causes	3	15.79	5.45	724	29.89	8.80
Total	19	100.00	34.55	2,422	100.00	29.44
Grand total	55		100.00	8,226		100.00

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TABLE 6.—*Metallurgical plants: Accidents during the year ended December 31, 1924*

State	Ore-dressing plants [1]					Smelting plants [2]					Auxiliary works				
	Killed	Seriously injured. (Time lost, more than 14 days)			Slightly injured. (Time lost, 1 to 14 days)	Killed	Seriously injured. (Time lost, more than 14 days)			Slightly injured. (Time lost, 1 to 14 days)	Killed	Seriously injured. (Time lost, more than 14 days)			Slightly injured. (Time lost, 1 to 14 days)
		Permanent total disability [3]	Permanent partial disability [4]	Others [5]			Permanent total disability [3]	Permanent partial disability [4]	Others [5]			Permanent total disability [3]	Permanent partial disability [4]	Others [5]	
Alabama															
Alaska															
Arizona	8		1	14	22										
Arkansas				115	328	7		5	175	326	3		3	128	245
California															
Colorado			4	28	71			1	42	65				1	8
Idaho	1		1	23	31				27	79	1			5	16
Illinois			4	18	28						1			3	3
Kansas				1	10			7	70	268			1	29	125
Michigan	1			1	19				17	51					
Minnesota	1			24	39				24	35					
Missouri	1		2	7	29								3	4	37
Montana				21	92				20	88				45	206
Nevada	1			34	43	1			72	42				102	38
New Jersey			1	20	87				35	64	1			20	26
New Mexico	2			7	29	2		1	100	165	5		1	51	131
New York				13	148										
Oklahoma		1	2	18	116						2		10	37	111
Oregon		1	6	81	193	1		3	69	210	1		1	17	115
Pennsylvania				1	3										
South Dakota								1	76	235				40	73
Tennessee	1			4	16										
Texas				4	23				18	61	2			20	82
Utah				11	38				34	47					
Vermont	3		10	92	432	2		2	86	147		1	1	8	26
Virginia				3	42										
Washington	1			6	7								1	1	12
West Virginia				4					7	2	1			3	1
Wisconsin								1	11	87				13	60
Other States					18						1				3
Total, 1924			3	21	40	3		12	125	280	1		3	77	475
Total, 1923	20	3	33	571	1,904	16		33	1,008	2,252	19	1	24	604	1,793
	24		37	613	1,899	17	1	102	1,013	2,371	17		24	613	1,751

[1] Ore-dressing plants include stamp mills, sampling works, slime plants, lixiviation, leaching, cyanide, and flotation mills.
[2] Smelters include blast, reverabatory, and roasting furnaces; converters; casting department, and refineries.
[3] Permanent total disability: Loss of both legs or arms, one leg and one arm, total loss of eyesight, paralysis, or other condition permanently incapacitating workman from doing any work of a gainful occupation.
[4] Permanent partial disability: Loss of one foot, hand, leg, eye, one or more fingers, one or more toes, any dislocation where ligaments are severed, or any other injury known in surgery to be permanent partial disability.
[5] "Other serious accidents" in 1924 include 82 cases, of permanent partial disability and 1 case of permanent total disability.

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TABLE 7.—*Metallurgical plants: Accidents during the year ended December 31, 1924*

Cause	Killed	Temporary			Permanent partial [1]	Permanent total [2]	Total nonfatal	Grand total
		1 to 14 days	More than 14 days	Total				
Ore-dressing plants: [3]								
1. Haulage system (cars and motors, etc.)	1	49	40	89	2	.....	91	92
2. Railway cars and locomotives	1	25	15	40	1	.....	41	42
3. Crushers, rolls, or stamps	1	81	25	106	2	.....	108	109
4. Tables, jigs, etc	.....	33	6	39	1	.....	40	40
5. Other machinery	5	167	57	224	8	.....	232	237
6. Falls of persons	3	234	89	323	1	.....	324	327
7. Suffocation in ore bins	4	5	1	6	.....	.....	6	10
8. Falling objects (rocks, timbers, etc.)	1	181	65	246	3	1	250	251
9. Cyanide or other poisoning	.....	5	2	7	1	.....	8	8
10. Scalding (steam or water)	.....	28	10	38	.....	.....	38	38
11. Electricity	2	26	9	35	.....	.....	35	37
12. Hand tools, axes, bars, etc	.....	196	51	247	1	.....	248	248
13. Nails, splinters, etc	.....	140	28	168	.....	.....	168	168
14. Flying pieces of rock from sledging or crushing	.....	85	16	101	6	.....	107	107
15. Other causes	2	649	157	806	7	2	815	817
Total	20	1,904	571	2,475	33	3	2,511	2,531
Smelting plants: [4]								
16. Haulage system (cars, motors, etc.)	4	99	69	168	3	.....	171	175
17. Railway cars and locomotives	2	58	41	99	.....	.....	99	101
18. Cranes	.....	21	22	43	.....	.....	43	43
19. Other machinery	1	64	52	116	7	.....	123	124
20. Falls of persons	1	151	79	230	.....	.....	230	231
21. Suffocation in ore bins	.....	5	5	10	.....	.....	10	10
22. Flying or falling objects (rocks, timbers, etc.)	2	387	170	557	10	.....	567	569
23. Gas (burns or asphyxiation)	1	11	10	21	2	.....	23	24
24. Scalding (steam or water)	1	18	16	34	.....	.....	34	35
25. Electricity	.....	12	7	19	.....	.....	19	19
26. Hand tools, axes, bars, etc	.....	228	96	324	.....	.....	324	324
27. Nails, splinters, etc	.....	49	8	57	.....	.....	57	57
28. Burns from matte, slag, or molten metal (pouring or spilling)	3	498	228	726	4	.....	730	733
29. Hot-metal explosions	1	60	43	103	1	.....	104	105
30. Other causes	.....	591	162	753	6	.....	759	759
Total	16	2,252	1,008	3,260	33	.....	3,293	3,309
Auxiliary works:								
31. Haulage system (cars and motors, etc.)	2	83	50	133	1	.....	134	136
32. Railway cars and locomotives	1	34	30	64	.....	1	65	66
33. Falls of persons	.....	166	78	244	.....	.....	244	244
34. Falling objects (rocks, timbers, etc.)	4	255	80	335	1	.....	336	340
35. Nails and splinters, etc	.....	160	28	188	1	.....	189	189
36. Hand tools, axes, bars, etc	1	279	60	339	3	.....	342	343
37. Electricity	2	30	6	36	.....	.....	36	38
38. Machinery	4	128	80	208	9	.....	217	221
39. Failure of ladder, scaffold, or other support	2	18	15	33	.....	.....	33	35
40. Handling hot materials	.....	70	32	102	.....	.....	102	102
41. Other causes	3	570	145	715	9	.....	724	727
Total	19	1,793	604	2,397	24	1	2,422	2,441
Grand total	55	5,949	2,183	8,132	90	4	8,226	8,251

[1] Permanent partial disability: Loss of one foot, leg, hand, eye, one or more fingers, one or more toes, any dislocation where ligaments are severed, or any other injury known in surgery to be permanent partial disability.

[2] Permanent total disability: Loss of both legs or arms, one leg and one arm, total loss of eyesight, paralysis, or other condition permanently incapacitating workman from doing any work of a gainful occupation.

[3] Ore-dressing plants include stamp mills, sampling works, slime plants, lixiviation, leaching, cyanide, and flotation mills.

[4] Smelters include blast, reverberatory, and roasting furnaces; converters; casting department; and refineries. (Iron blast furnaces not included.) Number of wives left widows, 27. Number of children under 16 years of age left fatherless, 35.

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TABLE 8.—*Ore-dressing plants: Summary of fatalities and injuries, by causes and States*

	Killed				Injured			
	Total, 1916–1920	1922	1923	1924	Total, 1916–1920	1922	1923	1924
ACCIDENTS BY CAUSES								
1. Haulage system (cars, motors, etc.)	15	.....	2	1	626	116	144	91
2. Railway cars and locomotives	11	.....	3	1	211	54	93	41
3. Crushers, rolls, or stamps	6	.....	.....	1	601	90	182	108
4. Tables, jigs, etc	3	1	.....	.....	336	63	62	40
5. Other machinery	48	5	5	5	1,558	223	340	232
6. Falls of persons	23	1	5	3	1,710	197	259	324
7. Suffocation in ore bins	16	2	2	4	30	5	38	6
8. Falling objects (rocks, timbers, etc.)	6	.....	.....	1	1,606	216	236	250
9. Cyanide or other poisoning	2	1	.....	.....	109	4	6	8
10. Scalding (steam or water)	4	1	1	.....	124	27	22	38
11. Electricity	13	1	1	2	215	37	26	35
12. Hand tools, axes, bars, etc	1	.....	.....	.....	1,335	167	269	248
13. Nails, splinters, etc	.....	.....	.....	.....	746	105	255	168
14. Flying pieces of rock from sledging or crushing	.....	.....	.....	.....	928	163	124	107
15. Other causes	13	.....	5	2	3,824	517	493	815
Total	161	12	24	20	13,959	1,984	2,549	2,511
ACCIDENTS BY STATES								
Alabama	3	.....	.....	.....	62	2	16	.....
Alaska	7	.....	1	.....	396	28	39	36
Arizona	18	1	.....	8	2,517	244	310	444
Arkansas	1	.....	.....	.....	66	.....	14	.....
California	7	.....	1	.....	410	66	77	103
Colorado	18	1	1	.....	744	61	90	55
Idaho	1	.....	.....	1	277	37	55	50
Illinois	1	.....	.....	.....	79	11	44	11
Kansas	.....	.....	.....	.....	117	90	56	20
Michigan	9	.....	2	1	559	52	69	63
Minnesota	1	.....	3	1	159	52	58	38
Missouri	6	.....	1	1	892	76	117	113
Montana	14	3	2	.....	670	84	91	77
Nevada	17	4	3	1	624	134	137	108
New Jersey	6	.....	.....	.....	228	33	33	36
New Mexico	9	.....	.....	2	916	21	57	161
New York	10	.....	3	.....	570	69	123	137
Oklahoma	6	1	1	.....	983	201	284	281
Oregon	1	.....	.....	.....	39	.....	3	4
Pennsylvania	.....	.....	.....	.....	29	.....	1	.....
South Dakota	.....	.....	.....	1	143	28	14	20
Tennessee	3	.....	.....	.....	171	21	48	27
Utah	14	2	4	3	2,213	315	639	534
Vermont	.....	.....	.....	.....	59	58	69	45
Virginia	2	.....	.....	1	143	.....	27	13
Washington	.....	.....	.....	.....	41	5	13	4
Wisconsin	4	.....	.....	.....	389	7	10	18
Other States	3	.....	2	.....	463	201	55	113
Total	161	12	24	20	13,959	1,984	2,549	2,511

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TABLE 9.—*Smelting plants: Summary of fatalities and injuries, by causes and States*

	Killed				Injured			
	Total, 1916–1920	1922	1923	1924	Total, 1916–1920	1922	1923	1924
ACCIDENTS BY CAUSES								
16. Haulage system (cars, motors, etc.)	29	2	2	4	2,654	206	230	171
17. Railway cars and locomotives	11	1	1	2	435	53	102	99
18. Cranes	16	-------	-------	-------	484	40	46	43
19. Other machinery	34	1	2	1	1,539	121	124	123
20. Falls of persons	28	5	3	1	2,442	227	243	230
21. Suffocation in ore bins	3	-------	1	-------	85	2	---------	10
22. Flying or falling objects (rocks, timbers, etc.)	11	1	1	2	4,938	459	541	567
23. Gas (burns or asphyxiation)	2	1	1	1	396	38	39	23
24. Scalding (steam or water)	4	1	-------	1	362	20	37	34
25. Electricity	16	1	-------	-------	168	13	24	19
26. Hand tools, axes, bars, etc	-------	-------	-------	-------	2,924	263	293	324
27. Nails, splinters, etc	-------	-------	-------	-------	780	56	84	57
28. Burns from matte, slag, or molten metal, (pouring or spilling)	9	2	1	3	6,797	568	691	730
29. Hot-metal explosions	10	-------	3	1	871	62	128	104
30. Other causes	12	1	2	-------	7,847	874	905	759
Total	185	16	17	16	32,722	3,002	3,487	3,293
ACCIDENTS BY STATES								
Arizona	28	1	1	7	5,111	351	419	506
Arkansas	3	-------	-------	-------	439	---------	---------	---------
California	7	-------	1	-------	860	44	47	108
Colorado	10	1	2	-------	1,445	74	95	106
Illinois	11	2	1	-------	3,582	171	280	345
Kansas	7	-------	-------	-------	1,401	---------	---------	68
Michigan	2	1	1	-------	678	103	95	59
Missouri	4	-------	-------	-------	1,934	---------	119	108
Montana	14	3	2	1	1,111	97	128	114
Nevada	6	1	-------	-------	499	74	---------	99
New Jersey	19	4	1	2	2,796	263	338	286
Oklahoma	9	1	-------	1	3,000	218	302	282
Pennsylvania	8	-------	-------	-------	2,370	480	400	312
Texas	1	-------	-------	-------	559	36	---------	81
Utah	28	-------	3	2	1,989	171	261	235
West Virginia	1	1	-------	-------	611	123	203	99
Other States	27	1	5	3	4,237	797	800	805
Total	185	16	17	16	32,722	3,002	3,487	3,293

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TABLE 10.—*Ore-dressing plants: Summary of number killed and injured per thousand 300-day workers employed, by causes and States*

	Killed				Injured			
	Total, 1916–1920	1922	1923	1924	Total, 1916–1920	1922	1923	1924
ACCIDENTS BY CAUSES								
1. Haulage system (cars, motors, etc.)	0.144	-------	0.135	0.062	6.017	10.496	9.742	5.655
2. Railway cars and locomotives	.106	-------	.203	.062	2.028	4.886	6.291	2.548
3. Crushers, rolls, or stamps	.058	-------	-------	.062	5.777	8.143	12.312	6.711
4. Tables, jigs, etc	.029	0.091	-------	-------	3.230	5.700	4.194	2.486
5. Other machinery	.461	.452	.338	.311	14.976	20.177	23.001	14.416
6. Falls of persons	.221	.091	.338	.187	16.437	17.825	17.521	20.133
7. Suffocation in ore bins	.154	.180	.135	.249	.288	.452	2.571	.373
8. Falling objects (rocks, timbers, etc.)	.058	-------	-------	.062	15.437	19.544	15.965	15.535
9. Cyanide or other poisoning	.019	.091	-------	-------	1.048	.362	.406	.497
10. Scalding (steam or water)	.038	.091	.068	-------	1.192	2.443	1.488	2.361
11. Electricity	.125	.091	.068	.124	2.067	3.348	1.759	2.175
12. Hand tools, axes, bars, etc	.010	-------	-------	-------	12.832	15.110	18.198	15.410
13. Nails, splinters, etc	-------	-------	-------	-------	7.171	9.501	17.251	10.439
14. Flying pieces of rock from sledging or crushing	-------	-------	-------	-------	8.920	14.749	8.389	6.649
15. Other causes	.125	-------	.338	.124	36.757	46.779	33.351	50.643
Total	1.548	1.086	1.624	1.243	134.177	179.515	172.439	156.081
ACCIDENTS BY STATES								
Alabama	4.815	-------	-------	-------	99.518	74.074	202.532	-------
Alaska	2.370	-------	1.845	-------	134.101	83.333	71.955	115.756
Arizona	1.329	.889	-------	3.456	185.770	216.889	169.399	191.798
Arkansas	2.096	-------	-------	-------	138.365	-------	184.211	-------
California	1.694	-------	1.506	-------	99.202	142.857	115.964	174.873
Colorado	2.483	-------	1.259	-------	102.635	97.134	113.350	87.026
Idaho	.382	1.592	-------	2.020	105.766	102.493	98.921	101.010
Illinois	1.818	-------	-------	-------	143.636	161.765	346.457	127.907
Kansas	-------	-------	-------	-------	189.935	410.959	217.054	96.238
Michigan	.887	-------	1.807	.865	55.074	61.249	62.331	54.498
Minnesota	.718	-------	11.407	5.076	114.224	309.524	220.532	192.893
Missouri	1.154	-------	1.664	1.462	171.505	130.360	194.676	165.205
Montana	1.539	2.655	1.550	-------	73.634	74.336	70.543	64.597
Nevada	2.376	6.390	2.515	1.167	87.224	214.058	114.837	126.021
New Jersey	1.910	-------	-------	-------	72.565	79.710	73.497	78.608
New Mexico	.003	-------	-------	3.115	203.873	70.470	105.360	250.779
New York	3.308	-------	4.071	-------	188.554	91.029	166.893	125.458
Oklahoma	2.186	1.695	1.961	-------	358.106	493.220	556.862	421.922
Oregon	3.300	-------	-------	-------	128.713	-------	111.111	160.000
Pennsylvania	-------	-------	-------	-------	125.000	-------	13.699	-------
South Dakota	-------	-------	-------	4.367	88.986	101.449	60.606	87.336
Tennessee	1.954	-------	-------	-------	111.401	165.354	201.685	156.977
Utah	1.031	2.685	3.945	1.488	162.996	422.819	630.178	264.881
Vermont	-------	-------	-------	-------	82.865	763.158	802.326	555.556
Virginia	.737	-------	-------	4.831	52.729	-------	120.536	62.802
Washington	-------	-------	-------	-------	114.525	71.429	90.909	17.858
Wisconsin	3.540	-------	-------	-------	344.248	118.644	250.000	206.897
Other States	1.111	-------	2.736	-------	171.481	185.939	75.239	78.746
Total	1.548	1.086	1.624	1.243	134.177	179.515	172.439	156.081

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TABLE 11.—*Smelting plants: Summary of number killed and injured per thousand 300-day workers employed, by causes and States*

	Killed				Injured			
	Total 1916–1920	1922	1923	1924	Total 1916–1920	1922	1923	1924
ACCIDENTS BY CAUSES								
16. Haulage system (cars motors, etc.)	0.140	0.095	0.075	0.137	12.809	9.863	8.622	5.850
17. Railway cars and locomotives	.053	.048	.038	.068	2.099	2.538	3.824	3.387
18. Cranes	.077	-------	-------	-------	2.336	1.915	1.724	1.471
19. Other machinery	.164	.048	.075	.034	7.428	5.793	4.648	4.208
20. Falls of persons	.135	.240	.112	.034	11.786	10.868	9.109	7.868
21. Suffocation in ore bins	.015	-------	.038	-------	.410	.096	-------	.342
22. Flying or falling objects (rocks, timbers, etc.)	.053	.048	.038	.068	23.833	21.975	20.280	19.397
23. Gas (burns or asphyxiation)	.010	.048	.038	.034	1.911	1.819	1.462	.787
24. Scalding (steam or water)	.019	.048	-------	.034	1.747	.958	1.387	1.163
25. Electricity	.077	.048	-------	-------	.811	.622	.900	.650
26. Hand tools, axes, bars, etc	-------	-------	-------	-------	14.112	12.592	10.983	11.084
27. Nails, splinters, etc	-------	-------	-------	-------	3.765	2.681	3.149	1.950
28. Burns from matte, slag, or molten metal (pouring or spilling)	.044	.095	.038	.103	32.805	27.194	25.902	24.973
29. Hot-metal explosions	.048	-------	.112	.034	4.204	2.968	4.798	3.558
30. Other causes	.058	.048	.075	-------	37.873	41.844	33.924	25.966
Total	.893	.766	.637	.547	157.929	143.726	130.712	112.654
ACCIDENTS BY STATES								
Arizona	1.432	.624	.406	2.556	261.379	218.964	169.911	184.739
Arkansas	1.109	-------	-------	-------	162.232	-------	-------	-------
California	2.002	-------	4.808	-------	245.995	115.486	225.962	122.588
Colorado	.840	1.253	1.695	-------	121.449	92.732	80.508	98.057
Illinois	.550	1.341	.559	-------	178.948	114.688	156.512	151.962
Kansas	.807	-------	-------	-------	161.424	-------	-------	117.851
Michigan	.417	2.353	1.795	-------	141.221	242.353	170.557	131.408
Missouri	.581	-------	-------	-------	281.023	-------	179.487	166.154
Montana	1.239	1.874	1.018	.497	98.336	60.587	65.140	56.604
Nevada	1.046	2.985	-------	-------	86.964	220.896	-------	92.098
New Jersey	.863	1.575	.391	.553	127.068	103.543	132.063	73.501
Oklahoma	.467	.734	-------	.694	155.731	159.941	197.903	195.697
Pennsylvania	.414	-------	-------	-------	122.639	185.185	134.907	101.463
Texas	.190	-------	-------	-------	125.261	65.693	-------	112.344
Utah	1.954	-------	1.091	.873	138.829	87.782	94.875	102.575
West Virginia	.220	1.536	-------	-------	134.463	188.940	288.352	157.895
Other States	.985	.217	.767	.609	154.593	172.848	122.662	102.404
Total	.893	.766	.637	.547	157.929	143.726	130.712	112.654

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TABLE 12.—*Metallurgical plants: Summary of number of men employed (actual number), by States*

	Ore-dressing plants				Smelting plants			
	Total 1916–1920	1922	1923	1924	Total 1916–1920	1922	1923	1924
Alabama	997	48	102	44				
Alaska	2,562	269	476	277				
Arizona	12,290	1,052	1,626	1,967	16,616	1,755	2,066	2,338
Arkansas	582		79	(1)	2,557		(1)	(1)
California	3,919	428	622	637	3,172	361	215	825
Colorado	7,356	642	874	629	11,443	784	1,000	926
Idaho	2,711	419	552	520	(1)		(1)	(1)
Illinois	606	86	140	80	17,192	1,311	1,483	1,865
Kansas	836	257	292	254	8,250		(1)	539
Michigan	9,842	983	1,105	1,201	4,541	496	559	470
Minnesota	2,262	244	515	399				
Missouri	5,645	578	631	711	6,371		558	607
Montana	8,782	1,043	1,183	1,066	10,615	1,382	1,629	1,684
Nevada	6,363	673	1,085	834	4,818	415	(1)	886
New Jersey	3,039	428	458	442	18,968	2,192	2,108	2,972
New Mexico	4,155	367	475	537	(1)		(1)	(1)
New York	3,271	864	831	1,090	(1)		609	(1)
Oklahoma	3,122	663	615	733	17,328	1,459	1,287	1,207
Oregon	384		47	28	(1)		(1)	
Pennsylvania	247		71	10	16,179	2,157	2,451	2,575
South Dakota	1,452	229	209	197	(1)		(1)	(1)
Tennessee	1,723	172	250	224	(1)		150	156
Texas	(1)		312	354	4,345	452	(1)	593
Utah	11,508	814	902	1,679	11,839	1,714	2,264	1,879
Vermont	745	79	89	81	(1)			
Virginia	2,981		271	225	(1)		(1)	(1)
Washington	483	63	148	190	(1)		(1)	500
West Virginia					3,984	535	579	515
Wisconsin	1,248	59	47	92	(1)		(1)	
Other States	3,263	1,216	892	1,234	24,762	4,482	5,481	4,404
Total	102,374	11,676	14,899	15,735	182,980	19,495	22,439	24,941

[1] Included in "Other States."

TABLE 13.—*Metallurgical plants: Summary of full-time, or 300-day workers, by States*

	Ore-dressing plants				Smelting plants			
	Total 1916–1920	1922	1923	1924	Total 1916–1920	1922	1923	1924
Alabama	623	27	79	28				
Alaska	2,953	312	542	311				
Arizona	13,549	1,125	1,830	2,315	19,554	1,603	2,467	2,739
Arkansas	477		76		2,706			
California	4,133	462	664	589	3,496	381	208	881
Colorado	7,249	628	794	632	11,898	798	1,180	1,081
Idaho	2,619	361	556	495				
Illinois	550	68	127	86	20,017	1,491	1,789	2,270
Kansas	616	219	258	210	8,679			577
Michigan	10,150	849	1,107	1,156	4,801	425	557	449
Minnesota	1,392	168	263	197				
Missouri	5,201	583	601	684	6,882		663	650
Montana	9,099	1,130	1,290	1,192	11,298	1,601	1,965	2,014
Nevada	7,154	626	1,193	857	5,738	335		1,075
New Jersey	3,142	414	449	458	22,004	2,540	2,559	3,619
New Mexico	4,493	298	541	642				
New York	3,023	758	737	1,092			638	
Oklahoma	2,745	590	510	666	19,264	1,363	1,526	1,441
Oregon	303		27	25				
Pennsylvania	232		73	7	19,325	2,592	2,965	3,075
South Dakota	1,607	276	231	229				
Tennessee	1,535	127	238	172			182	186
Texas			356	357	5,261	548		721
Utah	13,577	745	1,014	2,016	14,327	1,948	2,751	2,291
Vermont	712	76	87	81				
Virginia	2,712		225	207				
Washington	358	70	143	224				605
West Virginia					4,544	651	705	627
Wisconsin	1,130	59	40	87				
Other States	2,700	1,081	731	1,078	27,401	4,611	6,522	4,930
Total	104,034	11,052	14,782	16,093	207,195	20,887	26,677	29,231

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TABLE 14.—*Metallurgical plants: Summary of days of labor performed, by States*

	Ore-dressing plants				Smelting plants			
	Total 1916–1920	1922	1923	1924	Total 1916–1920	1922	1923	1924
Alabama	187,134	8,190	23,780	8,282				
Alaska	885,906	93,509	162,656	93,439				
Arizona	4,064,248	337,363	549,133	694,532	5,866,040	490,757	739,948	821,889
Arkansas	142,988		22,670		811,785			
California	1,239,925	138,687	199,067	176,839	1,048,923	114,899	62,511	284,151
Colorado	2,175,028	188,418	238,254	189,692	3,570,055	239,456	353,968	324,388
Idaho	785,525	108,151	166,919	148,450				
Illinois	165,089	20,493	38,214	25,652	6,005,430	447,263	536,751	680,998
Kansas	185,115	65,770	77,436	63,017	2,603,717			172,975
Michigan	3,044,798	254,585	332,078	346,865	1,440,223	127,618	167,179	134,634
Minnesota	417,541	50,530	78,975	59,190				
Missouri	1,560,366	174,735	180,317	205,176	2,064,880		198,886	194,870
Montana	2,729,915	338,866	387,061	357,700	3,389,550	480,392	589,444	604,239
Nevada	2,145,829	187,738	357,971	257,166	1,721,598	100,525		322,610
New Jersey	942,620	124,251	134,575	137,316	6,601,071	762,080	767,782	1,085,836
New Mexico	1,348,439	89,534	162,331	192,488				
New York	906,555	227,237	220,969	327,691			191,501	
Oklahoma	823,514	176,940	152,975	199,818	5,778,852	408,810	457,755	432,448
Oregon	90,788		8,246	7,480				
Pennsylvania	69,386		22,031	2,226	5,797,227	777,465	889,476	922,366
South Dakota	481,902	82,791	69,395	68,636				
Tennessee	460,346	38,188	71,275	51,491			54,555	55,766
Texas			106,837	107,102	1,578,140	164,469		216,385
Utah	4,072,924	223,604	304,123	604,644	4,297,896	584,510	825,355	687,201
Vermont	213,830	22,800	25,940	24,217				
Virginia	813,878		67,344	62,108				
Washington	107,360	21,099	42,826	67,317				181,576
West Virginia					1,363,050	195,275	211,335	188,190
Wisconsin	339,808	17,755	12,025	26,114				
Other States	809,243	324,237	219,321	323,366	8,220,121	1,383,140	1,956,729	1,478,914
Total	31,210,000	3,315,471	4,434,744	4,828,014	62,158,558	6,266,159	8,003,175	8,769,224

TABLE 15.—*Metallurgical plants: Summary of average number of days plants were operated, by States*

	Ore-dressing plants				Smelting plants			
	Total 1916–1920	1922	1923	1924	Total 1916–1920	1922	1923	1924
Alabama	188	171	233	188				
Alaska	346	348	342	337				
Arizona	331	321	338	353	353	274	358	351
Arkansas	246		287		317			
California	316	324	320	278	331	317	291	320
Colorado	296	293	273	302	312	305	354	350
Idaho	290	258	302	285				
Illinois	272	238	273	321	349	341	362	365
Kansas	221	256	265	248	316			321
Michigan	309	259	301	289	317	257	299	295
Minnesota	185	207	153	148				
Missouri	276	302	286	289	324		356	321
Montana	311	325	327	336	319	348	362	359
Nevada	337	279	330	308	357	242		304
New Jersey	310	290	294	311	348	348	364	365
New Mexico	325	244	342	358				
New York	277	263	266	301			314	
Oklahoma	264	267	249	273	333	280	356	358
Oregon	236		175	267				
Pennsylvania	281		310	223	358	360	363	358
South Dakota	332	362	332	348				
Tennessee	267	222	285	230			364	357
Texas		315	342	303	363	364		365
Utah	354	275	337	360	363	341	365	365
Vermont	287	289	291	299				
Virginia	273		249	276				
Washington	222	335	289	354				363
West Virginia					342	365	365	365
Wisconsin	272	301	256	284				
Other States	248	261	246	262	332	309	357	336
Total	305	284	298	307	340	321	357	352

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TABLE 16.—*Metallurgical plants: Summary of percentage of fatalities and injuries, by causes*

Cause of accident	Killed				Injured			
	Total 1916–1920	1922	1923	1924	Total 1916–1920	1922	1923	1924
ORE-DRESSING PLANTS								
1. Haulage (cars and motors)	9.32	.....	8.33	5.00	4.48	5.85	5.65	3.63
2. Railway cars or locomotives	6.83	.....	12.50	5.00	1.51	2.72	3.65	1.63
3. Crushers, rolls, or stamps	3.73	.....	.....	5.00	4.31	4.54	7.14	4.30
4. Tables, jigs, etc	1.86	8.33	.....	.....	2.41	3.17	2.43	1.59
5. Other machinery	29.81	41.67	20.83	25.00	11.16	11.24	13.34	9.24
6. Falls of persons	14.29	8.33	20.83	15.00	12.25	9.93	10.16	12.90
7. Suffocation in ore bins	9.94	.....	8.33	20.00	.22	.25	1.49	.24
8. Falling objects (rocks, timber, etc.)	3.73	16.67	.....	5.00	11.51	10.89	9.26	9.96
9. Cyanide or other poisoning	1.24	8.33	.....	.....	.78	.20	.24	.32
10. Scalding (steam or water)	2.48	8.33	4.17	.....	.89	1.36	.86	1.51
11. Electricity	8.08	8.33	4.17	10.00	1.54	1.86	1.02	1.39
12. Hand tools, axes, bars, etc	.62	.....	.....	.....	9.56	8.42	10.55	9.88
13. Nails, splinters, etc	.....	.....	.....	.....	5.34	5.29	10.00	6.69
14. Flying pieces of rock from sledging or crushing	.....	.....	.....	.....	6.65	8.22	4.87	4.26
15. Other causes	8.07	.....	20.83	10.00	27.39	26.06	19.34	32.46
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
SMELTING PLANTS								
16. Haulage (cars, motors, etc.)	15.68	12.50	11.76	25.00	8.11	6.86	6.60	5.19
17. Railway cars or locomotives	5.95	6.25	5.88	12.50	1.33	1.76	2.92	3.01
18. Cranes	8.65	.....	.....	.....	1.48	1.33	1.32	1.30
19. Other machinery	18.38	6.25	11.76	6.25	4.70	4.03	3.56	3.74
20. Falls of persons	15.13	31.25	17.65	6.25	7.46	7.56	6.97	6.98
21. Suffocation in ore bins	1.62	.....	5.88	.....	.26	.07	.....	.30
22. Flying or falling objects (rocks, timbers, etc.)	5.95	6.25	5.88	12.50	15.09	15.29	15.51	17.22
23. Gas (burns or asphyxiation)	1.08	6.25	5.88	6.25	1.21	1.27	1.12	.70
24. Scalding (steam or water)	2.16	6.25	.....	6.25	1.11	.67	1.06	1.03
25. Electricity	8.65	6.25	.....	.....	.52	.43	.69	.58
26. Hand tools, axes, bars, etc	.....	.....	.....	.....	8.94	8.76	8.40	9.84
27. Nails, splinters, etc	.....	.....	.....	.....	2.38	1.87	2.41	1.73
28. Burns from matte, slag, or molten metal (pouring or spilling)	4.86	12.50	5.88	18.75	20.77	18.92	19.82	22.17
29. Hot-metal explosions	5.40	.....	17.65	6.25	2.66	2.07	3.67	3.16
30. Other causes	6.49	6.25	11.76	.....	23.98	29.11	25.95	23.05
Total	.....	100.00	100.00	100.00	100.00	100.00	100.00	100.00

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TABLE 17.—*Metallurgical-plant accidents, 1919–1924*

Cause	Killed	Permanent disability		Temporary disability [3]	Slight [4]	Total columns 4 and 5	Total columns 2 to 5	Total fatal and nonfatal
		Total [1]	Partial [2]					
	1	2	3	4	5	6	7	8
Ore-dressing plants:								
1. Haulage system (cars, motors, etc.)	5	.....	4	233	405	638	642	647
2. Railway cars and locomotives	6	.....	6	73	198	271	277	283
3. Crushers, rolls, or stamps	5	.....	19	204	437	641	660	665
4. Tables, jigs, etc	2	1	3	59	220	279	283	285
5. Other machinery	31	.....	49	386	1,062	1,448	1,497	1,528
6. Falls of persons	15	.....	9	420	1,007	1,427	1,436	1,451
7. Suffocation in ore bins	16	.....	.....	11	52	63	63	79
8. Falling objects (rocks, timbers, etc.)	2	2	11	302	969	1,271	1,284	1,286
9. Cyanide or other poisoning	2	.....	2	18	29	47	49	51
10. Scalding (steam or water)	3	.....	1	40	124	164	165	168
11. Electricity	8	.....	3	49	129	178	181	189
12. Hand tools, axes, bars, etc	.....	.....	15	215	990	1,205	1,220	1,220
13. Nails, splinters, etc	.....	.....	7	86	716	802	809	809
14. Flying pieces of rock from sledging or crushing	.....	.....	17	87	682	769	786	786
15. Other causes	11	3	22	680	2,882	3,562	3,587	3,598
Total	106	6	168	2,863	9,902	12,765	12,939	13,045
Smelting plants:								
16. Haulage system (cars, motors, etc.)	20	2	26	511	777	1,288	1,316	1,336
17. Railway cars and locomotives	4	.....	4	160	236	396	400	404
18. Cranes	6	.....	12	115	145	260	272	278
19. Other machinery	15	.....	38	260	568	828	866	881
20. Falls of persons	18	.....	14	474	983	1,457	1,471	1,489
21. Suffocation in ore bins	4	.....	.....	7	11	18	18	22
22. Flying or falling objects, rocks, timbers, etc.)	10	.....	34	813	2,350	3,163	3,197	3,207
23. Gas (burns or asphyxiation)	4	.....	4	65	146	211	215	219
24. Scalding (steam or water)	4	.....	1	82	114	196	197	201
25. Electricity	4	.....	5	30	81	111	116	120
26. Hand tools, axes, bars, etc	.....	1	22	436	1,351	1,787	1,810	1,810
27. Nails, splinters, etc	.....	.....	3	63	339	402	405	405
28. Burns from matte, slag, or molten metal (pouring or spilling)	9	.....	88	1,105	3,053	4,158	4,246	4,255
29. Hot-metal explosions	7	.....	16	174	316	490	506	513
30. Other causes	12	.....	37	1,144	4,273	5,417	5,454	5,466
Total	117	3	304	5,439	14,743	20,182	20,489	20,606
Auxiliary works:								
31. Haulage system (cars, motors, etc.)	14	.....	12	165	336	501	513	527
32. Railway cars and locomotives	13	2	3	106	202	308	313	326
33. Falls of persons	7	.....	3	371	776	1,147	1,150	1,157
34. Falling objects crocks, timbers, etc.)	8	.....	11	451	1,395	1,846	1,857	1,865
35. Nails, splinters, etc	.....	.....	3	82	611	693	696	696
36. Hand tools, axes, bars, etc	1	.....	15	247	1,128	1,375	1,390	1,391
37. Electricity	14	.....	2	43	105	148	150	164
38. Machinery	9	.....	26	288	611	899	925	934
39. Failure of ladders, scaffold, or other support	7	.....	4	59	82	141	145	152
40. Handling hot materials	2	.....	3	105	287	392	395	397
41. Other causes	12	.....	31	712	3,106	3,818	3,849	3,861
Total	87	2	113	2,629	8,639	11,268	11,383	11,470
Grand total	310	11	585	10,931	33,284	44,215	44,811	45,121

[1] Permanent total disability. Loss of both legs or arms, one leg and one arm, total loss of eyesight, paralysis, or other conditions permanently incapacitating workman from doing any work of a gainful occupation.
[2] Permanent partial disability. Loss of one foot, leg, hand, eye, one or more fingers, one or more toes, any dislocation where ligaments are severed, or any other injury known in surgery to be permanent partial disability.
[3] Time lost, more than 14 days.
[4] Time lost, 1 to 14 days, inclusive.

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TABLE 18.—*Copper metallurgical plants: Summary of labor and accidents at selected plants, 1916–1924*

	1916 1920	1921	1922	1923	1924
MILLS					
Number of plants	133	28	42	23	24
Men employed	36,598	2,286	3,888	4,539	5,584
Number of 300-day workers	41,013	1,450	3,847	5,218	6,522
Total days' labor (shifts)	12,304,012	435,069	1,154,186	1,565,321	1,956,462
Average days active	336	190	297	344	350
Number killed	33	----------	1	9	14
Number injured	4,841	251	666	1,003	1,101
Number killed per thousand 300-day workers	0.80	----------	0.26	1.72	2.15
Number injured per thousand 300-day workers	118.04	173.10	173.12	192.22	168.81
SMELTERS					
Number of plants	106	23	26	23	26
Men employed	51,863	5,339	7,163	9,183	11,189
Number of 300-day workers	56,885	4,490	7,497	10,823	13,174
Total days' labor (shifts)	17,065,450	1,346,976	2,248,960	3,246,922	3,952,230
Average days active	329	252	314	354	353
Number killed	62	8	8	7	10
Number injured	9,466	611	970	1,240	1,293
Number killed per thousand 300-day workers	1.09	1.78	1.07	0.65	0.76
Number injured per thousand 300-day workers	166.41	136.08	129.39	114.57	98.147

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TABLE 19.—*Copper metallurgical plants: Accidents, by causes, at selected plants, 1916 to 1924*

Cause of accident	Mills										Smelters									
	Killed					Injured					Killed					Injured				
	1916–1920	1921	1922	1923	1924	1916–1920	1921	1922	1923	1924	1916–1920	1921	1922	1923	1924	1916–1920	1921	1922	1923	1924
Haulage system (cars, motors, etc.)	5	----	----	----	1	211	8	53	51	32	12	----	----	1	3	674	32	74	61	64
Railway cars and locomotives	1	----	----	1	----	71	3	24	61	27	2	----	1	----	1	231	16	25	55	72
Crushers, rolls, or stamps	----	----	----	----	----	122	9	23	72	32	----	----	----	----	----	----	----	----	----	----
Tables, jigs., etc	1	----	----	----	----	135	3	12	24	6	----	----	----	----	----	----	----	----	----	----
Cranes	----	----	----	----	----	----	----	----	----	----	5	----	----	----	----	271	20	27	39	31
Other machinery	16	----	3	3	3	568	28	67	109	59	7	----	----	1	----	426	25	51	61	68
Falls of persons	3	----	----	1	3	785	37	87	128	160	7	2	4	2	1	828	60	90	110	103
Suffocation in ore bins	4	----	1	1	3	13	----	4	33	1	1	2	----	----	----	77	----	1	----	5
Falling objects (rocks, timbers, etc.)	3	----	----	----	1	775	27	88	73	124	3	1	----	1	2	1,536	127	180	281	300
Cyanide or other poisoning	----	----	----	----	----	47	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Gas (burns or asphyxiation)	----	----	----	----	----	----	----	----	----	----	1	----	1	----	----	48	1	8	6	6
Scalding (steam or water)	1	----	1	1	----	42	2	13	13	22	1	1	----	----	1	97	4	5	18	18
Electricity	1	----	----	----	1	119	5	20	1	21	6	----	----	----	----	76	4	4	16	17
Hand tools, axes, bars, etc	----	----	----	----	----	654	24	74	99	100	----	----	----	----	----	865	55	89	101	152
Nails, splinters, etc	----	----	----	----	----	374	4	48	184	82	----	----	----	----	----	176	16	20	17	29
Flying pieces of rock from sledging or crushing	----	----	----	----	----	130	15	20	13	31	----	----	----	----	----	----	----	----	----	----
Burns from matte, slag, or molten metal	----	----	----	----	----	----	----	----	----	----	4	1	2	1	2	1,584	68	133	188	204
Hot-metal explosions	----	----	----	----	----	----	----	----	----	----	9	----	----	1	----	223	24	11	41	42
Other causes	8	----	----	2	2	1,776	86	133	142	404	4	1	----	----	----	2,408	159	252	246	182
Total	43	0	5	9	14	5,822	251	666	1,003	1,101	62	8	8	7	10	9,520	611	970	1,240	1,293

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TABLE 20.—*Metallurgical plants: Labor and accident data for 1924, classified by length of shift* [1]

Length of shift	Men employed		Days of labor performed	Total hours	Average days per man	Average hours per man	Killed	Nonfatal injuries				Total fatal and nonfatal
	Actual number	Equivalent in 300-day workers						Permanent disability		Temporary disability	Slight	Total nonfatal
								Total	Partial			
MILLS												
8 hours	7,493	7,993	2,397,964	19,183,712	320	2,560	14	----------	14	287	989	1,290	1,304
9 hours	905	836	250,781	2,257,029	277	2,494	----------	----------	1	22	51	74	74
10 hours	1,816	1,540	462,036	4,620,360	254	2,544	2	1	5	89	308	403	405
11 hours	151	137	41,155	452,705	273	2,998	----------	----------	----------	3	21	24	24
12 hours	575	517	154,959	1,859,508	269	3,234	----------	----------	----------	7	12	19	19
All others and not stated	4,518	4,759	1,427,680	----------	316	----------	4	2	13	149	501	665	669
Total	15,458	15,782	4,734,575	----------	306	----------	20	3	33	557	1,882	2,475	2,495
SMELTERS													
8 hours	18,724	21,948	6,584,231	52,673,848	352	2,813	14	----------	24	794	1,795	2,613	2,627
9 hours	535	553	165,900	1,493,100	310	2,791	----------	----------	----------	28	20	48	48
10 hours	115	112	33,572	335,720	292	2,919	----------	----------	----------	2	16	18	18
11 hours	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------
12 hours	279	288	86,444	1,037,328	310	3,718	----------	----------	1	19	61	81	81
All others and not stated	5,288	6,330	1,899,077	----------	359	----------	2	----------	8	165	360	533	535
Total	24,941	29,231	8,769,224	----------	352	----------	16	----------	33	1,008	2,252	3,293	3,309

[1] Alaska not included.

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TABLE 21.—*Metallurgical plants: Fatalities and injuries per million hours of exposure, classified by length of shift, during the year ended December 31, 1924*

Character of disability	8 hours	9 hours	10 hours
MILLS			
Fatal	0.730	.....	0.433
Permanent total disability	.....	.....	.217
Permanent partial disability	.730	0.443	1.082
Other serious	14.961	9.747	19.262
Slight	51.554	22.596	66.662
Total injuries	67.245	32.786	87.223
Total fatalities and injuries	67.975	32.786	87.656
SMELTERS			
Fatal	.266	.....	.....
Permanent partial disability	.456	.....	.....
Other serious	15.073	18.753	.....
Slight	34.078	13.395	.....
Total injuries	49,607	32.148	.....
Total fatalities and injuries	49,873	32.148	.....

TABLE 22.—*Metallurgical plants: Accident data for 1924, based on size of plant* [1]

Men employed	Number of plants	Men employed: Actual number	Men employed: Equivalent in 300-day workers	Days of labor performed	Average days active	Killed	Injured	Killed per 1,000 300-day workers	Injured per 1,000 300-day workers
MILLS									
1 to 9	199	907	630	188,858	208	1	163	1.59	258.73
10 to 14	69	792	728	218,428	276	.....	122	.....	167.35
15 to 24	56	1,045	889	266,815	255	.....	177	.....	199.10
25 to 49	54	1,887	1,784	535,128	284	1	332	.56	186.10
50 to 99	34	2,275	2,235	670,647	295	4	408	1.79	182.55
100 to 199	19	2,589	2,818	845,320	327	3	277	1.07	98.30
200 to 299	5	1,284	1,458	437,492	341	5	176	3.43	120.71
300 and over	10	4,679	5,240	1,571,887	336	6	820	1.15	156.46
Total	446	15,458	15,782	4,734,575	306	20	2,475	1.27	156.82
SMELTERS									
1 to 24	30	302	232	69,797	231	.....	47	.....	201.72
25 to 49	6	219	254	76,179	348	1	82	3.94	322.84
50 to 99	17	1,268	1,407	422,044	333	.....	283	.....	201.14
100 to 199	19	2,677	2,875	862,443	322	.....	580	.....	201.74
200 to 299	11	2,603	3,081	924,209	355	5	440	1.62	142.81
300 and over	31	17,872	21,382	6,414,552	359	10	1,861	4.68	87.04
Total	114	24,941	29,231	8,769,224	352	16	3,293	.55	112.65

[1] Alaska not included.

TABLE 23.—*Ore-dressing plants: Accident data based on average number of days mills were operated in 1924* [1]

Average number of days	Number of plants	Men employed: Actual number	Men employed: Equivalent in 300-day workers	Days of labor performed	Killed	Injured	Killed per thousand 300-day workers	Injured per thousand 300-day workers
314 and more	111	7,633	9,189	2,756,577	16	1,573	1.74	171.18
300 to 313	79	3,084	3,217	965,118	2	366	.62	113.77
250 to 299	65	2,465	2,245	673,443	1	283	.45	126.06
200 to 249	33	697	545	163,551	.....	59	.....	108.26
150 to 199	44	568	322	96,641	1	57	3.11	177.02
100 to 149	33	295	119	35,668	.....	21	.....	176.47
50 to 99	41	503	117	35,300	.....	114	.....	974.36
Less than 50	40	213	28	8,277	.....	2	.....	71.43
Total	446	15,458	15,782	4,734,575	20	2,475	1.27	156.82

[1] Alaska not included.

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TABLE 24.—*Smelting plants: Accident data based on average number of days smelters were operated in 1924*

Average number of days	Number of plants	Men employed		Days of labor performed	Killed	Injured	Killed per thousand 300-day workers	Injured per thousand 300-day workers
		Actual number	Equivalent in 300-day workers					
314 and more	74	21,578	26,185	7,855,347	12	2,763	0.46	105.52
300 to 313	14	2,020	2,076	622,828	4	302	1.93	145.47
250 to 299	7	799	738	221,417	.....	204	.....	276.42
200 to 249	2	70	52	15,660	.....	3	.....	57.69
150 to 199	7	126	68	20,221	.....	6	.....	88.24
100 to 149	1	175	82	24,675	.....	11	.....	134.15
50 to 99	4	42	12	3,543	.....	.....	.....	.....
Less than 50	5	131	18	5,533	.....	4	.....	222.22
Total	114	24,941	29,231	8,769,224	16	3,293	.55	112.65

TABLE 25.—*Auxiliary works: Accident data based on average number of days the auxiliary works were operated in 1924* [1]

Average number of days	Number of plants	Men employed		Days of labor performed	Killed	Injured	Killed per thousand 300-day workers	Injured per thousand 300-day workers
		Actual number	Equivalent in 300-day workers					
314 and more	79	11,613	13,927	4,178,236	15	1,580	1.08	113.45
300 to 313	30	2,297	2,343	702,898	3	615	1.28	262.48
250 to 299	18	861	782	234,531	.....	87	.....	111.25
200 to 249	6	287	262	78,680	.....	24	.....	91.60
150 to 199	9	127	78	23,275	.....	37	.....	474.36
100 to 149	6	54	22	6,526	1	10	45.45	454.55
50 to 99	4	17	5	1,371	.....	5	.....	1,000.00
Less than 50	6	106	15	4,640	.....	12	.....	800.00
Total	158	15,362	17,434	5,230,157	19	2,370	1.09	135.94

[1] Alaska not included.

ACCIDENTS IN MINERAL INDUSTRIES

Table 28 has been prepared to show the comparative accident rates for 1924 in all branches of the mineral industry for which statistics are compiled by the Bureau of Mines. Reports of nonfatal injuries at coal mines are not received by the Bureau of Mines. For all other branches of the industry, however, the lowest rate for nonfatal injuries was at by-product coke ovens and the highest nonfatal injury rate was at lead and zinc mines in the Mississippi Valley States. The relative positions of these two industries have remained the same during the past three years. The lowest fatality rate was at smelting plants; the highest fatality rate was at mines producing gold, silver, and miscellaneous metals. The rate for this group in 1924 was higher than usual because a disastrous mine flood caused a heavy loss of life. The second highest fatality rate was at coal mines.

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TABLE 26.—*United States: Number of men killed per thousand 300-day workers employed in mineral industries*

	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924
Coal mines	4.97	4.46	4.70	4.66	4.44	3.93	4.25	3.94	4.27	3.78	4.19	4.89	4.39	4.79
All metal mines	4.45	4.09	3.72	3.92	3.89	3.62	4.44	3.57	3.47	3.16	3.09	3.54	3.01	3.51
Copper mines	5.18	4.53	4.08	3.85	3.72	3.64	5.88	3.45	3.54	3.43	3.70	3.00	3.11	3.55
Gold and miscellaneous metal mines	4.28	4.32	3.83	4.06	4.79	4.05	4.03	4.27	4.41	4.20	3.29	5.35	3.93	4.99
Iron mines	4.64	3.96	3.29	3.78	2.88	3.41	3.54	3.45	3.09	2.34	3.04	3.00	2.38	2.95
Lead and zinc mines (Mississippi Valley)	4.03	4.28	3.90	4.32	5.37	3.14	4.09	3.58	4.13	3.27	2.58	2.64	2.73	2.76
Nonmetallic mineral mines	2.01	1.66	3.02	3.72	2.43	3.00	2.48	1.67	1.65	2.89	1.98	2.39	2.67	1.94
All quarries (including outside works)	2.23	2.27	2.10	2.64	1.80	2.26	1.83	2.11	1.93	2.31	2.00	1.92	1.68	1.63
Cement-rock quarries	3.96	3.48	2.99	3.95	1.60	2.38	2.99	2.14	2.66	2.75	1.91	2.27	1.67	2.26
Granite quarries	1.92	1.87	1.47	3.36	2.27	1.86	1.54	2.10	1.81	2.06	2.57	1.42	.90	1.19
Limestone quarries	2.21	2.19	2.13	2.38	1.70	2.36	1.79	1.79	1.97	2.58	1.97	1.87	1.87	1.64
Marble quarries	.71	2.48	1.81	2.72	1.00	1.16	.57	2.14	.51	.92	1.49	.43	.59	1.22
Sandstone and bluestone quarries	1.82	1.16	1.32	1.45	.93	1.28	.99	2.38	.76	.56	1.25	1.19	.48	1.88
Slate quarries	2.60	2.62	3.05	2.99	2.02	2.62	1.31	3.16	1.78	1.49	1.40	3.15	2.13	.57
Trap-rock quarries	1.77	3.08	2.40	2.49	3.46	4.45	2.61	4.47	2.56	2.61	2.88	3.36	3.35	1.84
All quarries (excluding outside works)					2.17	2.32	2.00	2.19	2.29	2.81	2.22	2.31	1.97	1.90
All quarries (outside works only)					1.05	2.15	1.53	1.98	1.34	1.59	1.68	1.38	1.26	1.24
Metallurgical plants:														
Ore-dressing plants			.99	1.51	1.57	1.41	1.93	1.55	1.48	1.25	.50	1.09	1.62	1.24
Smelters			1.93	1.02	1.05	.73	1.05	.92	1.09	.66	.99	.77	.64	.55
Auxiliary works						.89	.94	.85	.31	1.08	1.08	1.21	.94	1.08
All coke ovens			1.97	2.12	1.21	1.32	2.14	2.06	1.92	1.64	1.23	1.59	1.76	1.16
Beehive coke ovens					.65	1.29	1.30	1.16	.92	1.09	1.76	1.66	1.68	.75
By-product coke ovens					1.75	1.35	3.13	2.84	2.55	1.92	1.09	1.57	1.79	1.26

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TABLE 27.—*United States: Number of men injured per thousand 300-day workers employed in mineral industries*

	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924
Coal mines														
All metal mines	170.27	190.11	179.59	211.87	248.56	250.64	240.97	237.09	233.60	242.02	249.68	268.48	275.41	278.04
Copper mines	225.25	258.42	230.80	312.19	322.01	319.58	313.35	322.12	309.60	323.20	317.53	320.78	349.09	347.82
Gold and miscellaneous metal mines	80.33	93.04	70.37	126.90	201.49	190.79	172.51	185.18	191.29	204.82	225.46	260.29	298.87	297.80
Iron mines	252.30	241.81	268.31	224.07	233.51	240.17	227.54	185.45	202.35	200.49	210.91	177.44	150.23	151.01
Lead and zinc mines (Mississippi Valley)	139.40	158.29	133.51	189.01	238.27	263.09	272.99	319.54	292.28	327.97	379.67	464.23	495.65	464.16
Nonmetallic mineral mines	34.03	66.40	84.86	99.75	107.78	144.70	123.58	104.69	139.27	161.88	215.47	247.51	212.47	178.74
All quarries (including outside works)	63.85	69.82	88.81	114.92	117.30	175.62	185.14	147.07	144.20	145.51	174.54	171.93	176.04	175.03
Cement-rock quarries	136.52	139.59	207.99	226.20	148.25	248.83	277.73	238.65	231.58	182.49	213.50	191.08	213.71	169.13
Granite quarries	53.07	44.87	69.60	109.21	96.72	143.99	189.73	109.68	124.70	130.53	134.09	147.21	177.99	195.73
Limestone quarries	67.99	79.98	89.05	114.23	127.43	176.10	175.52	141.34	134.05	143.11	178.54	177.72	169.31	173.58
Marble quarries	43.39	42.35	68.67	121.31	93.80	125.20	100.20	58.02	75.26	91.98	100.87	127.76	127.88	131.89
Sandstone and bluestone quarries	34.68	45.26	74.36	69.08	66.56	127.86	118.89	148.04	131.96	100.56	156.22	100.63	119.42	169.09
Slate quarries	17.72	15.01	18.81	28.61	33.08	85.00	112.04	96.29	98.51	108.20	135.18	127.40	149.11	159.98
Trap-rock quarries	69.76	68.89	87.77	152.56	232.85	237.84	222.92	205.17	186.47	208.89	229.92	258.01	228.47	234.39
All quarries (excluding outside works)					127.57	158.63	162.95	148.29	146.65	139.62	167.09	177.16	178.11	178.00
All quarries (outside works only)					96.90	206.06	223.81	145.03	140.28	154.04	185.79	164.76	173.05	170.61
Metallurgical plants:														
Ore-dressing plants			122.38	94.19	109.65	135.66	121.12	139.54	122.21	156.07	151.05	179.51	172.44	156.03
Smelters			174.71	175.44	157.69	195.61	152.88	148.40	141.46	136.37	149.89	143.71	130.71	112.65
Auxiliary works						142.10	169.33	139.63	101.29	113.92	138.54	120.26	132.37	137.43
All coke ovens			107.73	103.06	90.78	153.49	188.59	219.64	145.66	114.13	133.62	93.77	101.18	79.54
Beehive coke ovens					39.84	100.37	94.43	131.11	125.96	102.54	118.52	98.28	122.48	113.54
By-product coke ovens					140.00	217.09	300.06	296.06	158.33	120.04	137.50	92.15	92.95	71.33

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TABLE 28.—*Accident rates in different branches of mineral industries in 1924, compared on a 300-day basis (length of shift not considered)*

Branch of mineral industry	Average days active	Men employed		Days of labor performed	Killed	Injured	Number killed or injured per thousand 300-day workers	
		Actual number	Equivalent in 300-day workers (calculated)				Killed	Injured
Coal mines	192	779,613	499,897	149,968,980	2,396	(1)	4.79	.....
All metal mines	290	123,128	119,113	35,734,008	418	33,118	3.51	278.04
Copper mines	315	32,477	34,092	10,227,645	121	11,858	3.55	347.52
Gold, silver, and miscellaneous metal mines	293	29,718	29,043	8,712,931	145	8,649	4.99	297.80
Iron mines	269	36,629	32,839	9,851,755	97	4,959	2.95	151.01
Lead and zinc mines (Mississippi Valley)	290	12,734	12,319	3,695,664	34	5,718	2.76	464.16
Nonmetallic mineral mines	281	11,570	10,820	3,246,013	21	1,934	1.94	178.74
All quarries (including outside works)	269	94,242	84,426	25,327,858	138	14,777	1.63	175.03
Cement rock quarries	328	12,519	13,694	4,108,087	31	2,316	2.26	169.13
Granite quarries	250	12,153	10,111	3,033,257	12	1,979	1.19	195.73
Limestone quarries	265	48,391	42,752	12,825,631	70	7,421	1.64	173.58
Marble quarries	298	5,764	5,717	1,715,259	7	754	1.22	131.89
Sandstone and bluestone quarries	235	5,430	4,258	1,277,432	8	720	1.88	169.09
Slate quarries	258	4,114	3,538	1,061,315	2	566	.57	159.98
Traprock quarries	223	5,871	4,356	1,306,877	8	1,021	1.84	234.39
All quarries (excluding outside works)	256	59,126	50,506	15,151,796	96	8,990	1.90	178.00
All quarries (outside works only)	290	35,116	33,920	10,176,062	42	5,787	1.24	170.61
Metallurgical plants:								
Ore-dressing plants	307	15,735	16,093	4,828,014	20	2,511	1.24	156.03
Smelters	352	24,941	29,231	8,769,224	16	3,293	.55	112.65
Auxiliary works	341	15,520	17,624	5,287,225	19	2,422	1.08	137.43
All coke ovens	303	20,451	20,681	6,204,448	24	1,645	1.16	79.54
Beehive coke ovens	187	6,450	4,025	1,207,549	3	457	.75	113.54
By-product coke ovens	357	14,001	16,656	4,996,899	21	1,188	1.26	71.33
Total, 1924	220	1,073,630	787,065	236,119,757	3,031	57,766	3.85	201.16
Total, 1923	222	1,153,894	852,145	255,643,525	3,071	59,570	3.60	208.91

[1] Not available.

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